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ABSTRACT

In pursuance of resolution 2.141 (a) adopted by the General Conference at its sixteenth session (October-November 1970), the Intergovernmental Conference for the Establishment of a World Science Information System (UNISIST) was organized by Unesco. The purpose of the Conference held October 4-8, 1971 was to make recommendations covering the basic principles of the proposed world science information system and the mechanisms and procedures by which member states and international organizations could play an active role in its implementation. The resolution adopted by the Conference and its general report appear in this volume. Additional appendices include the report of the U.S. delegation and remarks by the U.S. representatives to the Conference. (Author/SJ)

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UNISIST

Paris
4 - 8 October 1971

Intergovernmental Conference for the Establishment of a World Science Information System

Final Report

Unesco

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SUMMARY

In pursuance of resolution 2.141 (a) adopted by the General Conference at its sixteenth session (October-November 1970), the Intergovernmental Conference for the Establishment of a World Science Information System (UNISIST) was organized by Unesco.

The purpose of the Conference was to make recommendations covering the basic principles of the proposed world science information system and the mechanisms and procedures by which Member States and international organizations could play an active rôle in its implementation.

The resolution adopted by the Conference and its general report appear below.

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INTRODUCTION

1. In accordance with resolution 2.141 (a) adopted by the General Conference of Unesco at its sixteenth session, the General Conference authorized the Director-General to convene an intergovernmental conference to advise him on the desirability of establishing a programme to implement the recommendations made in the study conducted jointly by Unesco and the International Council of Scientific Unions (ICSU) on the feasibility of a world science information system (UNISIST).

2. Subsequently, the Unesco Executive Board by its decision 6.1.1 at its 86th session authorized the Director-General to transmit invitations to Unesco Member States and Associate Members in accordance with Article 21(1) of Unesco Regulations. Invitations were also sent to States which are members of one or more United Nations organizations in accordance with Article 21(3); to organizations of the United Nations system in accordance with Article 21(4), and, in accordance with Article 21(5) to certain categories of intergovernmental and non-governmental international organizations to attend as observers.

3. The Intergovernmental Conference met in plenary session at Unesco House, Paris, from 4 to 8 October 1971.

Antecedents of the Conference

4. The UNISIST study was initiated by an exchange of correspondence between the Director-General of Unesco and the President of ICSU in April 1966, and subsequently approved at the fourteenth session of the General Conference of Unesco, 25 October - 30 November 1966 (resolution 2.222 (b)). The feasibility study, supported jointly by Unesco and ICSU with supplementary assistance to the latter from the Ford Foundation, was conducted over the succeeding four years by a joint Central Committee chaired by Professor Harrison Brown, Foreign Secretary of the United States National Academy of Sciences. The co-operation between Unesco, as a principal intergovernmental organization concerned with the international growth of science and technology, and ICSU, the principal non-governmental international organization dedicated to the same goals, was very close throughout the study. It was in recognition of this exemplary co-operation that special provisions were made in the Rules of Procedure for ICSU to play a special rôle at the Conference. ICSU was invited to play an advisory rôle in all plenary sessions through the presence of its President on the platform as well as through the participation of a large delegation of observers, and a representative of ICSU was invited to represent ICSU's interests on the Conference Steering Committee as a non-voting member.

5. The UNISIST study resulted in the publication of a report entitled "Study Report on the Feasibility of a World Science Information System" and of a Synopsis of that Report ("Synopsis of the Feasibility Study on a World Science Information System"). The Synopsis was used as the working document for the conference, while the Report constituted a reference document: both versions were made available to all participants at the Intergovernmental Conference. In addition, the Proceedings of the UNISIST study, consisting of the minutes, reports and contract studies initiated by the Central Committee, accompanied by the minutes and reports of the working groups convened to investigate particular problem areas, were assembled and issued in a microfiche edition through the co-operation of the (FR) Centre national de recherche scientifique. These proceedings had been forwarded through the co-operation of the permanent delegates to Unesco, to the appropriate national libraries or archives of Unesco Member States.

6. The Intergovernmental Conference for the Establishment of a World Science Information System (UNISIST) was attended by delegates representing 84 Member States and one non-Member State of Unesco. The delegations of several countries were headed by individuals of ministerial rank. A total of 40 intergovernmental and non-governmental organizations was represented by individuals in the capacity of observers. The largest group of

observers was organized by the International Council of Scientific Unions (ICSU), the co-sponsors of the UNISIST Study.

7. Mr. René Maheu, Director-General of Unesco represented the Secretariat at the inaugural and closing sessions of the Conference. Professor A. Buzzati-Traverso, the Assistant Director-General for Science, and Professor I. Malecki, Director of the Department of Science Policy and Promotion of Basic Sciences, were in attendance throughout the plenary sessions. The Secretary of the Conference was Dr. Adam Wysocki, Director of the Division of Scientific Documentation and Information, and the Assistant Secretary was Mr. J. Tocatlian. Supporting the Secretary in the organization and conduct of the Conference was the staff of the Division, supplemented by a small group of invited experts.

I. GENERAL REPORT

Inaugural session

8. At the first plenary session, the Director-General of Unesco welcomed the delegates and expressed the hope that they would agree to endorse the principles of UNISIST to discuss the programme priorities, and to provide firm guidance on the desirability of establishing an organizational structure within Unesco. He expressed the view that the further development of the UNISIST philosophy could only be maintained with the assistance of all sectors of the scientific and technological communities, information specialists and documentalists. He addressed his appeal especially to the Member States, and asked them to give their support to the development of scientific and technical information not only at the national but also at the international level. He drew particular attention to the need for close and continuing co-operation between the International Council of Scientific Unions and Unesco.

9. In responding, on behalf of the International Council of Scientific Unions, to the Director-General's remarks, Professor Ambartsumian, President of ICSU, stressed the inseparability of science and scientific and technical information, and acknowledged the long and distinguished record of the International Council of Scientific Unions and its predecessor in organizing scientific bibliography and documentation internationally.

10. The Romanian delegation stated that its Government considered that the only legitimate representative of the Chinese people was the Government of the People's Republic of China. Similarly, the Romanian Government considered that the only legitimate representatives of South Viet-Nam and the Khmer Republic were, respectively, the Provisional Revolutionary Government of South Viet-Nam and the Royal Government of National Union of Norodom Sihanouk. The Romanian delegation also regretted that States such as the German Democratic Republic, the Democratic Republic of Viet-Nam and the Democratic People's Republic of Korea had not been invited to the Conference and asked that his statement on this subject should appear in the Report of the Conference. This delegation was supported by the delegations from the Cuban Revolutionary Government, from the People's Republic of Bulgaria, and from the Hungarian People's Republic. The delegation of the Union of Soviet Socialist Republics noted that it was not possible to discuss a "World System" without representation from the German Democratic Republic, the Chinese People's Republic, the People's Democratic Republic of Korea and the Democratic Republic of Viet-Nam, and expressed its conviction of the urgent necessity to eliminate this historical injustice.

11. The delegation of Viet-Nam asked for the report to mention that it represented the Government of the Republic of Viet-Nam which was effective and lawful because it was the outcome of normal elections, while the permanent delegation of the Republic of China requested in writing that the record reaffirm its sole right to participate in the UNISIST Conference.

12. In reply to the intervention of the delegate from Romania, the delegate of the Khmer Republic wished the record to show that his country, recognized by 119 Member States of the United Nations, was making a considerable effort to develop its scientific potential.

13. On the proposal of the delegation from the People's Republic of Poland seconded by the delegate from Japan, Professor Harrison Brown (United States of America) was elected President of the Conference by acclamation.

14. In view of the importance of the issues to be discussed, it was agreed that Rule 3 of the Rules of Procedure should be modified to provide for an Assistant Rapporteur-General to help the Rapporteur-General of the Conference.

15. Following the adoption of the Agenda and discussion on the number of vice-presidents appropriate for the Conference, the following were elec-elected:

Dr. Hermann Liebaers, Belgium
General Arthur Mascarenhas Façanha, Brazil

Dr. Ahmad Abd-El Hamid Kabesh, Arab Republic of Egypt
H.E. Professor F. Reza, Iran
Dr. Kanekuro Kaneshige, Japan
Mrs. B.A.M. Okusanya, Nigeria
H.E. Dr. Antonin Mrázek, Czechoslovakia
Mr. J.M. Gvishiani, USSR

16. Mr. H.T. Hookway (United Kingdom) was elected Rapporteur-General and Mr. N.B. Arutyunov (USSR), Deputy Rapporteur-General, in each case by acclamation.

17. The President then called upon Mr. Pierre Piganiol to present a paper to the Conference entitled "Science and Information in Prospect". Mr. Piganiol called upon governments to waken to the needs and to the importance of scientific and technical information, and upon scientists to understand its complexities and to assist in resolving them.

18. The President then presented a paper, entitled "Scientific information today - a scientist's view", in which he reviewed the attitude of an individual scientist towards the information he creates and uses; the history of the joint UNESCO/ICSU/UNISIST Study; and, finally, an account of the basic lessons learned during the course of the feasibility inquiry.

19. The Conference Steering Committee, consisting of the President, Vice-President and Rapporteur-General, together with the President of ICSU ex officio, met between the morning and the afternoon sessions of the first day to consider:

(a) the work plan of the Conference;
(b) its calendar;
(c) the organization of a drafting committee charged with the responsibility of merging the several resolutions submitted by the national delegations.

20. On the recommendations of the Steering Committee the Conference agreed that discussion of the UNISIST Report should be in three sections:

(a) principles and goals;
(b) programme objectives;
(c) organization and management.

The Conference also agreed that a drafting committee should be formed and instructed to present for the Conference either three resolutions, one on the principles of UNISIST, one on its programme objectives and a third on the organization and management of the UNISIST programme; or a single resolution which would combine these three. The Conference then appointed, on the recommendations of the Steering Committee, the members of a drafting committee composed of the Rapporteur-General (ex officio), the Assistant Rapporteur-General, Dr. M. Cremer (Federal Republic of Germany), Dr. Ricardo Gietz (Argentina), Mr. J. Brown, (Canada), Mr. R. Harte (United States of America), Mr. J. d'Olier (France), Mr. J. Dutz (Hungary), Miss W. Partaningrat (Indonesia), H.E. M.V. Lipatti (Romania), Mr. B. Tell (Sweden), Dr. V. Rybatchenkov (Union of Soviet Socialist Republics), Mr. M. Roche (Venezuela).

21. The Cuban delegation stated that the election of the Vice-Presidents by acclamation rather than by voting had not allowed delegations to express their views adequately. The Revolutionary Government of Cuba requested that the record show that it did not support the election of the Vice-President from Brazil.

Principles of UNISIST

22. All delegations expressed general support for the principles of UNISIST, however, some countries were hesitant about giving unqualified support to all 22 recommendations of the report without further careful study.

23. In expressing support for the UNISIST principles, many countries expressed the view that future activities should be concentrated on catalyzing and co-ordinating the development of bilateral and multilateral arrangements for sharing resources and services.

24. Great stress was placed on the need to continue the co-operation between ICSU and Unesco, and to maximize the involvement of United Nations Agencies, regional intergovernmental organizations, and international non-governmental organizations.

25. All delegates who spoke assumed that UNISIST included technology, and that subsequently the social sciences and humanities would be included as soon as practicable; however, a number of delegations, while agreeing that the subject coverage should be expanded to cover these fields, nevertheless expressed the view that this should be an evolutionary process and not be included at the start of the programme.

26. Most delegations contributing to the discussion stressed the fact that national self-sufficiency in scientific and technical information could not be achieved and emphasized the necessity to develop international co-operation in order to ameliorate the problems of providing effective information services.

27. It was pointed out, therefore, that considerable attention should be paid to the need for internationally-agreed standards and rules to ensure effective interconnexion of the large varieties of information systems and services currently available or being developed.

28. Several delegations observed that the UNISIST concept should take into account the need for multilingual information tools and procedures if a world-wide system was to be developed.

29. A number of delegations stressed the need to ascertain user requirements before embarking on extensive programmes to stimulate the development of new kinds of information services.

30. The necessity for all Member States and particularly the developing countries, to provide

an appropriate infrastructure for scientific and technical information, based on specific and known needs, was widely recognized.

31. There was clear evidence of the need for better education and training of users in the use of information tools and services, and in particular, Poland offered to create an international training centre to meet the needs of UNISIST. The same country also proposed the establishment of a scholarship fund financed by countries participating in UNISIST.

32. Several countries and international organizations offered to assist the UNISIST programme by providing the results of their experience in the development of information systems, the results of research on information problems, and by co-operation in the initiation of co-ordinated programmes.

33. In the light of these general considerations most delegations made it clear that they considered the basic UNISIST activities should be located within Unesco and financed mainly from the Regular budget of that Organization.

34. One delegation stressed the desirability that each government should ensure, as far as possible, the indexing of its scientific and technical literature in standardized form, so that the exchanges of magnetic tapes (in standardized format) can be facilitated.

Programme objectives

35. The President invited delegations to submit comments on Programme Objectives of UNISIST as proposed in the Synopsis of the UNISIST Report, namely:

I. Tools of systems intercommunication (Rec. 1-6)
II. Strengthening institutional rôles (Rec. 7-10)
III. Strengthening human resources (Rec. 11-14)
IV. Economic and political environment (Rec. 15-19)
V. Scientific and technical information in developing countries (Rec. 20-21)

36. In discussing Programme Objective I, a large number of delegates and observers requested that more reliance be placed on the competence of international bodies such as ISO, FID, IFLA, for the development of standards, in view of their sizeable experience and achievements in that field. A few suggested that a more appropriate title for this Group of Recommendations was "International Communications Standards".

37. The publication of a manual of communication standards within the framework of UNISIST was felt to be a useful step, and it was pointed out that such was in course of preparation.

38. The logical priority of Recommendation 1 was stressed by a number of delegates: a continuing assessment of on-going activities in the field of scientific and technical information was felt to be a necessary basis for the development of the co-operative programmes to which UNISIST is dedicated. The Yugoslav delegation indicated that its Government would be prepared to undertake the organization of an international referral centre in Yugoslavia. Other points were:

(a) the need to develop proper standards or "statistical indicators" to facilitate the analysis of information activities;
(b) the advisability of restricting for practical reasons the proposed referral system to the more significant information services.

39. A few delegates emphasized the high priority that should be given to Recommendation 2, on standards of bibliographic descriptions and transliteration rules. Such rules are of particular importance to countries such as Japan, where the romanization of proper names - among others - raised difficult problems. As for the standard codes and formats mentioned in this Recommendation, they should not be devised only for use in machine systems, but also in "manual" ones.

40. The usefulness of the international registry of scientific periodicals proposed in Recommendation 3 was acknowledged by a number of delegates, as a means to overcome language barriers. Attention was called to the desirable extension of its scope to cover the proceeedings of specialized conferences, which are of particular interest to developing countries. The Conference noted with satisfaction that the French Government, in co-operation with Unesco, will establish an International Centre for the International Serials Data System.

41. As regards Recommendation 4, it was suggested that a better title would be: "Terminologies, thesauri and classifications". Delegates referred to the need to study the integration of thesauri, the relation between standardization in the field of thesauri terminology and classification, and the compatibility of scientific terminologies with information languages. A delegate emphasized the importance of subject specification among the different problems considered in the UNISIST study, and recalled the conclusion of an International Symposium held recently in Yugoslavia (Herceg Novi, 28 June - 1 July 1971) on the rôle of UDC as a universal switching language.

42. The field of Recommendation 5 - for which the title "machine interface" was proposed - was also considered highly significant by one of the delegations; the setting up of a permanent advisory agency might be desirable, for the distribution of current information on the subject. The reference to conversion programmes as a "temporary" alternative to full compatibility in this Recommendation was felt by another delegation to be improper, since wholly compatible codes

and formats are still a distant goal.

43. In order to study the advancement of telecommunications and teleprocessing networks for the transfer of scientific and technical information - Recommendation 6 - the convening of a conference was felt by several delegations to be unnecessary; a working group would be more adequate. The economic and financial aspects of the subject in the case of developing countries should be highlighted, with a view to providing special facilities to the latter. One of the delegations stressed that the position taken by UNISIST on this subject might stimulate the readiness of commercial firms to develop special facilities for the remote transfer of scientific and technical information through advanced media.

44. A number of comments were expressed on the four Recommendations listed under Programme Objective II. As to Recommendation 7, it was generally agreed by all delegates who spoke that adequate libraries and documentation services were essential. The importance of strengthening basic access services, as in Recommendation 8, was also acknowledged, with a special emphasis laid on translation services; new mechanisms might have to be sought in the case of languages such as Japanese, for the sharing of translation costs among producers and receivers of translated documents. The desirability of receiving the support of governments and competent professional organizations for the implementation of this Recommendation was also stressed.

45. Recommendations 9 and 10 were often discussed in conjunction as several delegates argued that interrelations should be promoted between information analysis centres and data centres. A high priority was recommended by a number of delegations for the development of both, with the active co-operation of advanced scientists and competent international organizations, while acknowledgement was given to the need for more research and pilot studies to assess the functions which such centres should perform in relation to different categories of users.

Several delegations agreed that the scope of Recommendation 10 was too narrow: it should be extended to cover fields outside those covered by existing activities, and should also cover non-numerical data.

46. The discussion of Programme Objective III revealed a broad consensus on the position taken in Recommendations 11 and 12 concerning the necessary participation of scientists at various stages of information transfer; indeed, a number of delegations thought that this position might have been stated more firmly, and reaffirmed under other recommendations.

47. The need to consider the training of users of scientific and technical information, as well as that of information scientists (Recommendation 13) was often mentioned in this connexion; and it was thought that existing programmes in this area should be encouraged. More generally, delegates agreed that the subject of education and training should be among the higher priorities of UNISIST. The offer by the Government of Poland to set up a UNISIST training centre in Katowice (see No. 31) was consequently welcomed by many delegations; a number of them expressed their readiness to help in the operation of this centre, and possibly others if necessary. It was repeatedly stressed that the functions of such centres should be to provide educational assistance primarily, or even exclusively, to information specialists from the developing countries. This generous offer was noted and it was agreed that Unesco would discuss the detailed management with the Polish Government.

Another point of agreement between several delegations was the need to call on the experience of both international and national organizations with a competence in educational assistance for the implementation of the training programmes envisaged in Recommendation 13; the timing and location of such programmes was to receive careful consideration.

At a later stage in the discussion, the delegation of Poland indicated its desire to withdraw the draft resolution covering the establishment of a scholarship fund which it had submitted on this point (see No. 31), so as to have time to discuss with Unesco the possibilities for organization of the proposed fund.

48. The proposal to establish a group on the evaluation of research in information science (Recommendation 14) was welcomed by a number of delegations. It was considered that the work of this group should be restricted to the collecting and evaluation of on-going research efforts, as stated in Recommendation 14: the elaboration of proposals for new R&D projects should however be considered as part of its evaluative function. Nevertheless, a few delegates indicated that further information on the proposed scope and organization of this Group was needed before they could give their full support to Recommendation 14.

49. Among the four recommendations discussed under Programme Objective IV, the first one (Recommendation 15) was the most frequently mentioned: the existence of national scientific and technical information agencies was felt to be an essential requirement of UNISIST, and indeed, as one delegation put it, "a good investment". A few delegates insisted on the fact that such agencies should serve as co-ordination mechanisms, rather than operational bodies; in some cases, a given country might have to select one of several equally competent organizations to fulfil that function, and serve as a relay between UNISIST and other national agencies in the country.

One delegate stressed that although it was desirable to align national informational policies, in accordance with the principles of international co-operation, nevertheless the development and implementation of such policies were the concern of

the national governments themselves. Lastly, a number of delegations submitted that the rôle of the national agencies was to guide and stimulate but not to conduct the development of information resources, as indicated in Recommendation 15.

50. Concerning Recommendations 16 and 17, on national information networks, one delegation drew attention to a number of practical obstacles to developing these networks, including, for example, the lack of adequate reprographic facilities. Assistance to developing countries should give consideration to simple matters of this kind, prior to the implementation of service networking in a more sophisticated sense.

51. In the studies of pricing policies which form the subject of Recommendation 18, several delegations drew attention to a number of factors that had been overlooked in the report: costs, subsidies, geographical conditions, administrative and economic barriers, etc.

52. Similarly, it was thought that the scope of Recommendation 19, on administrative barriers should be widened so as to include legal issues other than copyright, equally relevant to the matter of scientific communication. It was felt also that reference should be made to the existing international machinery for copyright arrangements; the findings of the international conferences held at Unesco in July 1971 on this subject should receive the attention of UNISIST, prior to further action.

Two delegations felt that the wording of the recommendation was not acceptable in its present form and submitted alternatives for consideration by Unesco.

53. Programme Objective V was the subject of strong criticism by the delegations of a number of developing countries, as well as certain others. It was felt that the specific problems of developing countries had received far too little attention in the course of the UNISIST study, as well as in the UNISIST proceedings and report.

54. The delegation of Cuba stated that the serious inadequacy of scientific and technical information in the developing countries stemmed from the prolonged extortion of their wealth by certain powerful countries and for that reason the considerable difference in level could only be remedied by means of structural changes reflecting just reparation for the backwardness in which these countries remained.

55. The President indicated that much remained to be achieved even in the more industrialized countries, in the way of co-operation and standardization: the UNISIST study had therefore concentrated on the general problems which are not only of interest to developed nations, but which have to be solved in any case before UNISIST can become effective world wide.

56. A number of delegates from developing countries, while agreeing that a strong scientific infrastructure was desirable, felt that Recommendation 20 was not particularly helpful to them and that, as for Recommendation 21, more practical proposals were required, as well as a more explicit acknowledgement of the rôle which existing international organizations should play in their implementation. In particular, consideration should be given to the following suggestions:

(a) the regrouping of information produced by United Nations Agencies into fields of special interest to developing countries;
(b) the establishment of ad hoc information services tailored to the specific requirements of given developing countries or regions - which, it was repeatedly stressed, were neither similar to those of developed countries, nor necessarily comparable with one another;
(c) the development of appropriate mechanized information facilities as well as more conventional media which the report seems to favour;
(d) a marked increase in the range and number of training programmes and scholarships offered to developing countries in the field of scientific and technical information.

57. For all such measures, Unesco was called upon by a number of delegates to earmark appropriate funds within the framework of UNISIST, and to take advantage of the experience gained by other international organizations in handling similar programmes.

58. As to the whole range of programme objectives, varied opinions were expressed on overall priorities. The need for surveys and co-ordination of existing co-operative schemes in the field of scientific and technical information, followed by their evaluation, was mentioned several times in this context. However, the larger number of delegates expressed the view that Programme Objective I was the most urgent. Others considered Programme Objective IV to be more important and deemed that Recommendations 15 and 19 were of considerable importance. It was clear that there was very strong support for the view that close attention should be given to the information needs of developing countries in general, and to their educational aspects in particular.

59. Several international organizations, both governmental and professional, described their activities with reference to the various programmes under discussion and expressed their willingness to co-operate with UNISIST. The need to include technology, and eventually other sectors - such as social and economic sciences - in UNISIST was again stressed in this context.

Organization and management

60. The discussion was limited because a number of delegations had submitted draft resolutions. Subsequently the essential content of three resolutions was subsumed in a single composite

resolution, which was the basis of all subsequent discussions. The main arguments centred on the management structure as outlined in Recommendation 22 with the addition of a Steering Committee which, in the opinion of some delegates, should be substituted for the Intergovernmental Conference for reasons of efficiency and economy:

(a) The Intergovernmental Conference
(b) The Steering Committee
(c) The Advisory Committee
(d) The Executive Office.

In general it was felt that the management structure, which must be a major priority, should be largely co-ordinative rather than building up a large operation system.

Some delegations supported the view that this four-level management was unnecessarily heavy, and would have preferred the elimination of the Intergovernmental Conference.

61. While some delegations were insistent that financing should be provided from the Unesco budget without any related increase in that budget, a fairly large number felt that the Unesco budget should be suitably enlarged to meet the important UNISIST developments.

62. The Steering Committee elected by the Unesco General Conference with rotation of members should include information specialists with high professional qualifications. There was considerable divergence of views on the number of members (maximum of 10, 12-14 and 21-25).

The Conference wanted at least half of the Committee's members, however, to be drawn from the developing countries; there should be equitable geographical distribution; and the countries elected as officers of the present Conference should be included in the initial membership of the Steering Committee.

63. Advisory Committee. Some delegations wished to keep this group as small as practicable and all delegates who spoke urged that it should be composed of scientists, engineers and information specialists. It was also suggested that the Committee could use ad hoc working groups of experts for special questions.

64. Executive Office. It was generally agreed that this office should be located in Unesco, that it should be modest in size, staffed by highly qualified individuals and organized on the basis of existing information units in the various sectors of Unesco.

Discussion on composite resolution

65. The Drafting Committee finally succeeded in incorporating 14 single resolutions from individual and groups of delegations into one comprehensive resolution which was discussed paragraph by paragraph and finally accepted as a whole.

66. There was a strong feeling among delegations from developing countries that long-term projects must be prepared within UNISIST to help these countries in their manpower and institutional development to enable them to benefit from information sharing on a global scale. Also these countries requested a long-term plan for financial allocations so that they could play a full rôle in UNISIST. Special emphasis was laid on the need for effective training programmes, and for the development of an adequate infrastructure.

67. Several delegations expressed their concern that information and documentation specialists should be adequately represented in the main organs of UNISIST management. It was also suggested that such information specialists should be selected by consultation with the relevant international professional organizations.

68. The subject scope led to much discussion due partly to the differing connotations of the terms used in different languages. The extension of fundamental applied sciences and technology must initially be to those disciplines that are the most developed and relevant (e.g. engineering, medicine and agriculture are especially important for developing countries). Thus the social sciences and humanities should be progressively covered as the development of their information activities permits their inclusion.

69. The organizational structure of UNISIST management was the subject of a variety of views, in particular:

(a) The relative competence and interrelation of the Intergovernmental Conference and the Steering Committee;
(b) The optimal size of the Steering Committee.

On the one hand the Intergovernmental Conference due to its infrequent meetings was not in a position to supervise actively the programme. On the other hand it was felt that policy making should be vested in the conference rather than the Steering Committee, as well as the examination and evaluation of the progress of the UNISIST programme.

In contrast a few delegations would have preferred that the Unesco General Conference should entirely replace the proposed intergovernmental conference which could thus be dispensed with.

70. As UNISIST is to be based on the voluntary co-operation of existing information systems and services, it was suggested that private as well as public institutions should be included. However, certain delegations accepted this on the understanding that their participation should be on a non-profit basis.

71. Since the implementation of UNISIST must be co-ordinated with the biennial Unesco Conference, the question arose of how to meet the time lag before the next conference. The Assistant Director-General for Science explained that Unesco would prepare a programme based on the results of the Conference, and would develop several projects, for example, the International Serials Data System and training programmes, and would continue assistance for developing countries to the maximum extent possible within the Unesco budget.

CLOSING SESSION

72. Before the voting on the draft resolution commenced, the President of the Conference welcomed the Director-General and thanked him for agreeing to explain Unesco practice in relation to the draft resolution and to answer questions from delegates.

73. The Director-General expressed his pleasure at the constructive conclusions reached by the Conference which should now permit the implementation of UNISIST by Unesco.

His understanding of paragraph 5 of the draft resolution was that it concerned essentially that part of the whole programme which directly affected the developing countries.

He stressed that the final part of paragraph 10 was in fact not an addition but rather an amplification of the first part.

In paragraph 12, strictly speaking, the Intergovernmental Conference could not approve the UNISIST programme, but could only recommend it to the Unesco General Conference, which was the ultimate authority.

The same qualification must be understood as regards the rôle of the Steering Committee as proposed in paragraph 13.

74. In amplification of the Director-General's comments on paragraph 10, the Assistant Director-General for Science explained that financial means would have to be found within the Regular budget of Unesco approved by the General Conference.

75. Following the Director-General's statement, the delegate from Sudan welcomed the interpretation given by the Director-General, which provided a good basis for the acceptance of the draft resolution by the developing countries.

76. The delegate of the U.S.A. said that he accepted gratefully the clarification provided by the Director-General as the basis for his delegation's interpretation of the draft resolution, that his delegation would support it as an adequate basis for initiating UNISIST. Warning of the difficulty and complexity of the UNISIST task and the dangers of misinterpreting paragraph 5 as implying the possibility of quick global realization of UNISIT's long-range goals, his delegation believed that the resolution now permits practical first steps which can be made within the Unesco budget to co-ordinate and catalyze the more broadly-based international efforts that will be required.

77. The delegation of the USSR acknowledged the helpful comments made by the Director-General which in their opinion enabled them to accept the draft resolution without reservation.

78. However, the delegate from Canada explained that although his Government entirely approved of the UNISIST concept, it must reserve its decision on the UNISIST programme until that programme is presented for voting at the Unesco General Conference.

79. The Chairman then put the draft resolution (UNISIST/DR.15/Rev.2) to the vote. The results were 69 for, 0 against and 1 abstention. The resolution was therefore accepted.

80. The Conference then considered the draft report. On the suggestion of the President, supported by a number of delegates, it was agreed that only amendments of substance would be discussed in the plenary session, and that minor amendments to the text would be submitted directly to the Secretariat.

81. A general discussion followed in which a number of delegates, while expressing appreciation of the report as a whole, suggested amendments to the text. None of these was objected to, and it was agreed that all of them should be incorporated at appropriate places in the final report.

82. The President of the Conference then invited the delegates to vote the adoption of the report. The results were 66 for, 0 against and 0 abstentions. The report was accepted by acclamation.

83. Thanks were expressed on behalf of the Conference to the President, the Rapporteur-General, the Officers of the Conference and the Secretariat.

II. RESOLUTION

1. The Intergovernmental Conference for the Establishment of a World Science Information System (UNISIST),

2. Appreciating the great contribution made by Unesco and ICSU in proposing the programme for UNISIST and by the Convener of the UNISIST feasibility study, the Central Committee, and the Secretariat of Unesco which prepared this Conference and its working papers,

3. Emphasizing that UNISIST will contribute to the establishment of conditions whereby the world-wide utilization of the achievements of science and technology will become possible, and accepting the main conclusions of the Unesco-ICSU Central Committee that a World Scientific and Technical Information System is feasible,

4. Noting that science in modern society has become one of the decisive factors in economic and social development, in technical progress, and in the continuous growth of productive forces throughout the world, and that the rate of advance in scientific and technical achievement is to a large extent dependent upon the dissemination and utilization of scientific and technical information, and because science and technology are international there is vital need for improvement in the organization of international co-operation in these fields,

5. Considering that the action of UNISIST concerning developing countries must give priority to their needs which are, according to the Report of the United Nations Advisory Committee on the Application of Science and Technology to Development:

   (i) full access to the resources of scientific and technical information both in the developed and the developing countries;

   (ii) the necessary equipment for the evaluation, selection, transfer of the information most appropriate to their specific needs, particularly their economic development;

   (iii) the necessary means to enable them to adjust and absorb this information;

6. Recognizing the need for the active co-operation of States and of international governmental and non-governmental organizations to bring about effective results in the field of scientific and technical information, in accordance with the principles of the United Nations Charter,

7. Supporting the proposals made by the Unesco-ICSU Central Committee for the establishment of a UNISIST programme to advance a World Scientific and Technical Information System comprising a flexible network of existing and future information services,

8. Acknowledges that, from the outset, UNISIST must ensure that adequate information for the utilization of accumulated knowledge in science and technology is available and fully accessible and that UNISIST must be based on voluntary co-operation between existing and future autonomous national, regional and international scientific and technical information services and systems, whether public or private, and that in this respect, the special needs of individual States must be taken into account, in particular those

of developing countries; that initially, UNISIST must embrace the fundamental sciences, the applied sciences broadly conceived, technology, and subsequently, be extended to the social sciences and humanities as soon as possible; that such a World System must be multilingual, and must allow the use of national languages;

9. Recommends that the Director-General of Unesco study and take into consideration the recommendations of the Unesco/ICSU Central Committee, the comments and statements of Member States and international organizations as reflected in the Report of the Conference, when a practical programme for the implementation of UNISIST is being prepared and the necessary budgetary appropriations are being decided;

10. Invites the Director-General of Unesco to make adequate budgetary provision to enable Unesco to play its leading rôle in the rapid establishment of the first stages of UNISIST, taking into account the needs of developing countries, and providing the necessary funds in the Programme for 1973-1974, as well as in the long-term outline plan of the Organization;

11. Calls upon other agencies of the family of the United Nations, and on other international organizations, both intergovernmental and non-governmental, including those responsible for technical assistance to developing countries, to lend their full support and co-operation in the implementation of these recommendations;

12. Requests the Director-General of Unesco to convene periodically an Intergovernmental Conference to approve a long-term plan for UNISIST, and to review and evaluate the progress of the UNISIST programme;

13. Recommends that a Steering Committee of 18 to 23 members be elected at the General Conference of Unesco from among its Member States; this Committee will supervise and, when necessary, revise the priorities of the programme within the framework of the long-term plan of action approved by the General Conference of Unesco and will report to the Intergovernmental Conference;

14. Requests the Director-General of Unesco, in consultation with ICSU and other organizations active in appropriate fields, to establish an Advisory Committee of scientists, engineers and information specialists reflecting the interests of both producers and users and those responsible for information transfer to assess periodically the ability of the UNISIST programme to meet the needs of, and provide services to, the world's communities of scientists, engineers and technologists, and to report its findings to the Director-General and to give advice to the Steering Committee as deemed necessary;

15. Recommends the creation within the Secretariat of Unesco of a unit of scientific and technical information which would act as a permanent secretariat of UNISIST and which would be responsible for the preparation and implementation of measures concerning the creation and the development of UNISIST;

16. Recommends that, initially, the above proposed unit take measures for the compatibility of existing and future national, regional and international information systems;

17. Recommends further that at the same time special attention be paid to the complex and urgent needs of the developing countries and in particular their need for scientific and technical, as well as economic and social information, for training (notably by scholarship programmes), and for provision of adequate infrastructure, and for stimulating or initiating new systems when needed;

18. Invites the Director-General of Unesco to call the attention of the governments of Member States on the general principles of UNISIST and the opportunity of developing a national information policy in support of such principles;

19. Recommends to the Director-General of Unesco that he submit proposals based on this resolution to the next General Conference of Unesco.

III. APPENDICES

APPENDIX A

AGENDA

1. Opening of the Conference
2. Election of the President
3. Adoption of the Rules of Procedure
4. Adoption of the Agenda
5. Election of the Vice-Presidents and of the Rapporteur of the Conference
6. The case for a World Science Information System
   - 6.1 The need for a World Science Information System
   - 6.2 The feasibility of a World Science Information System
7. Adoption of the Report and Recommendations
8. Close of the Conference

APPENDIX B

ADDRESSES AND SPEECHES DELIVERED AT THE INAUGURAL SESSION

Address by Mr. René Maheu
Address by Mr. V. Ambartsumian
Science and information in prospect by Pierre Piganiol
Scientific information today - A scientist's view by Mr. H. Brown

Appendix B

Address by Mr. René Maheu,
Director-General of the United Nations
Educational, Scientific and Cultural Organization
(Unesco)

Your Excellencies,
Mr. President of the International Council of Scientific Unions,
Ladies and Gentlemen,

First of all I should like to say how happy I am to welcome you to this Intergovernmental Conference for the Establishment of a World Science Information System - a system already well known, even before it has become a practical reality, by its acronym, UNISIST. The fact that so many participants, representing some 80 States, are here today is eloquent testimony to the world-wide interest in the international transfer of scientific and technical information.

This should cause no surprise. The common heritage of knowledge is one of mankind's major resources. It determines the progress of science, which has been described as "collective thinking based upon collective memory". Every scientist should be able to draw on this collective memory, or, in other words, to know what discoveries have been made by his colleagues so that he may, perhaps, make use of them and carry them further; and may also avoid doing over again what has already been done elsewhere. That is not the situation at present, as you know better than anyone else. But that is the goal towards which we are bending our efforts.

The magnitude and complexity of the task, to be sure, cannot fail to impress us. For some time past, the numbers of research workers and the volume of scientific and technical documentation have been doubling approximately every fifteen years and there seems little likelihood that the pace will slow down in the coming years. Rather the reverse.

While the extent of the problem is rapidly growing, however, new facilities have, very fortunately, come into existence and are also developing very quickly, so that, with their help, a technical solution to the problem can now be contemplated. Advances in computer science are providing us with a tool making it possible to process a considerable volume of information and to offer the scientific community a whole series of documentation and information services. Modern technology is thus enabling us to overcome what appears at first sight to be the most formidable of all the obstacles, that is, the quantitative difficulty.

However, there are still many other very serious difficulties awaiting practical solutions. It is these which call particularly for world-wide collaboration. I need only mention the manifold preliminary questions relating to the criteria governing quality, selection and condensation, the choice of languages, terminology, organization and administration, costing and financing, the training of staff specialized in data-processing techniques, the development and adoption of international standards and, of course, compatibility as between systems.

This list, which is not exhaustive, shows clearly that even for those countries which are in the best position, recourse to international co-operation and to some international division of labour is absolutely necessary.

This is even more true for the countries which are not so rich or which have smaller populations and, above all, for the underdeveloped countries. There is no doubt that economic and social progress depends to a large extent on the transfer of scientific and technical information. The developing countries must therefore be helped to equip themselves with an infrastructure which will enable them to have access to the sources of this information and to make the best possible use of it, according to their needs.

Broadly outlined, these, ladies and gentlemen, are the extremely important considerations which prompted the holding of the Conference that I have the pleasure of opening today.

The beginning of the venture may be said to date back to April 1966, for it was at that time that Mr. J.M. HARRISON, then President of the International Council of Scientific Unions, aware of the obstacles impeding the circulation of science information between countries and of the dangers

of the situation with regard to the harmonious development of science, suggested that I study with his organization the possibility of setting up a world science information system.

Towards the end of the same year, the General Conference of Unesco, by resolution 2.222, adopted at its fourteenth session, authorized me to undertake "in co-operation with the International Council of Scientific Unions (ICSU) ... a critical and evaluative study of the needs of scientists for information, of the existing facilities and resources in the field of science information, and of the economic aspects of a world-wide system of science information networks; and to make preparations for the organization of an international conference on the communication of science information".

This study was carried out by the Unesco/ICSU Central Committee, specially set up for the purpose in January 1967, to whose Convener, Professor Harrison BROWN, I should like, on this occasion, to pay a warm tribute for his perseverance, clear-sightedness and constructive attitude in conducting the Committee's work. The Study Report on the feasibility of a World Science Information System - to give it its full title - was published last year, while an abridged version was issued this year to make its findings as widely known as possible. The Study showed, as you are aware, that it is both possible and necessary to set up a world science information system.

It was on the basis of this finding that the General Conference of Unesco, at its sixteenth session, in 1970, authorized me, by its resolution 2.141, to organize and follow up this intergovernmental conference, jointly with the International Council of Scientific Unions, with the aim of establishing UNISIST and putting it into operation.

The time has now come, therefore, to extend cordial greetings, and to express my gratitude, to Professor V.A. AMBARTSUMIAN, the President of the International Council of Scientific Unions, who has kindly consented to open this Conference with me. The exemplary co-operation between the Council and Unesco in the launching of UNISIST is proof of the advantage to be derived by both sides from close co-operation between an intergovernmental agency like Unesco and an international non-governmental organization like the International Council of Scientific Unions.

So far as Unesco is concerned, the importance it attaches to scientific and technical information does not mark a new departure. Article I of its Constitution stipulates that the Organization shall "maintain, increase and diffuse knowledge ... by encouraging co-operation among the nations in all branches of intellectual activity, ... the exchange of publications, ... and other materials of information; /and/ by initiating methods of international co-operation calculated to give the people of all countries access to the printed and published materials produced by any of them".

In the contribution it plans to make to bringing UNISIST into operation, Unesco, true to the mission entrusted to it by its founders, intends to discharge its obligation by means of the new facilities furnished by technical progress and necessary for meeting the needs of the countless existing and potential users.

In considering means and needs, the first question that comes to mind is: what can and what cannot, what should and what should not be covered by UNISIST at present?

In the initial phase of the study, it was thought advisable to limit the scope of the system contemplated to the basic natural sciences, as represented by the disciplines with which ICSU and its constituent Unions are concerned. This was regarded as a necessary precaution to avoid dispersion of effort. Subsequently, at the request of the World Federation of Engineering Organizations, it was decided to add the applied sciences and technology from the outset.

In my view there are many good reasons for this decision. First of all, there is the importance of the transfer of technology for the economic progress of the developing countries. Next, there is the fact that most modern documentation services and the majority of the world's abstracting services do not distinguish between scientific information and technical information. For this reason, I should like to ask the Conference to take the term "science information" in its widest sense and to recognize that science and technology have such close organic links between them that it is hard to deal with them separately.

There is, incidentally, no reason why UNISIST should not subsequently develop to take in other fields of knowledge. It is tempting, for instance, to include the social sciences, but it is obvious that, before any extension of that sort is contemplated, it will be well to define the specific characteristics of these sciences and the exact nature of their specialists' information requirements.

The creation of UNISIST offers a wide range of possibilities. While the long-term goal is to establish, within the various branches of science and technology, international networks of independent information services both willing and able to co-operate, the short-term aims which appear desirable are essentially as follows: to improve the interconnexions between traditional-type and computer-based documentation services, to enhance the efficiency of all these services, to ensure systems compatibility, to develop human resources as regards both quantity and quality, to enlist the support of governments, and to help the developing countries to equip themselves with scientific and technical information systems. These are urgent priorities in establishing the bases for information networks to operate on a world-wide scale.

This is the substance of the recommendations contained in the report before you, aiming at the establishment of a world science information system. In this connexion, an important preliminary

warning should be sounded: the world system as such should be regarded as the outcome of a very long-term operation which will initially take the form of an international programme for co-ordination. The programme will provide a framework for individual countries' efforts to improve and speed up the transfer of scientific information and to promote systems compatibility. It will also help to pinpoint the main deficiencies in the existing situation and to stimulate action to remedy them.

In this respect, I consider that the attitude of the Unesco/ICSU Central Committee in not proposing the establishment of a body which would take in and process scientific information from all over the world, and provide services to each individual country, has been most commendably realistic and pragmatic. Nor has the Committee suggested the creation of a body with sovereign powers to decide on all the measures to be taken. On the contrary, it has thought it better to recommend the development, within Unesco, of a service to be responsible for carrying out an international programme designed to harmonize existing activities and to act as a catalyst. This seems to me to be both wise and methodically sound.

There are already, let us not forget, a great many undertakings in progress, many of them very fruitful, whether they involve collaboration between institutions and information services, bilateral or multilateral agreements between independent or State-subsidized institutions, or action by international governmental or non-governmental organizations. Many of these organizations, incidentally, are represented here today, and I sincerely thank them for coming. UNISIST has no intention at all of setting up in competition with activities already under way. Its only purpose is to furnish a background for them and to take advantage of the energies they command to promote general progress on all fronts.

If the proposals submitted to you meet with your agreement, UNISIST would probably be launched on a relatively modest scale as regards the administrative machinery involved, but it should, in my view, be done in such a way as to impart a vigorous impetus to the efforts already being made in different parts of the world.

I should therefore like to take this opportunity of asking the competent authorities to point the way by providing support to the many institutions concerned with producing, processing, circulating and using scientific and technical information. By "competent authorities" I mean not only the governmental services responsible for formulating national policies as regards documentation, but also international governmental and non-governmental organizations, as well as the various professional groups that produce or use documentation. In some countries, most of the responsibilities involved are the exclusive prerogative of a State institution or a State-approved body. In others, the transfer of information at national level brings in several different bodies, with the State intervening mainly to plan, co-ordinate or finance activities in various ways and at various levels.

Whatever the system obtaining, governments play an important and often a decisive part. I would therefore begin by addressing myself to them, to urge them to lend their support to the development of scientific and technical information, both nationally and internationally.

In this connexion, it has given me great satisfaction to learn of two recent decisions. The French Government has informed me of its intention to co-operate in establishing a periodicals registration centre with international coverage as part of the International Serials Data System. I am convinced that the establishment of such centres, which might be financed by several countries, is likely to be of great assistance in operating an international science information system. I have also been informed by the authorities of another country that they intend to finance the clearing house for information on standardized scientific and technological terminology.

Without wishing to anticipate any recommendations that the Conference may draw up for governments, I should like to emphasize the importance of the measures for which they are the responsible authorities, both at national level, as regards the establishment of networks of libraries and documentation and information services, and the training of specialists, and at international level, as regards the adoption of standards or the conclusion of international agreements.

Next I shall turn to the scientists who carry out research and publish the results of their work. As creators and users of scientific knowledge, they will have to make a critical evaluation and selection of publications, to analyse and to condense them, all these operations being essential prerequisites for the working of the proposed system. Only if the information furnished by the system meets their needs will it develop further, while its improvement will depend on the critical observations they may make.

Lastly, I would address myself to the information specialists, on whom UNISIST will inevitably have to rely. I am thinking in particular of publishers, librarians, documentalists, specialists in information processing, and all those concerned with the publication, classification, storage, retrieval and dissemination of scientific and technical information. Without them, the future world science information system would never see the light of day, but as things are at present they are by no means in a position to meet all foreseeable needs. An enormous amount of training will have to be supplied. In this respect, the specialists in the developed countries have a major obligation towards the rest of the world, which I am confident they will not shirk.

Ladies and Gentlemen,

May I, before I end, again draw your attention to the importance of the conclusions you will reach.

As I have already said, you are asked to consider the report drawn up by the Unesco/ICSU Central Committee, and more particularly, the 22 recommendations it contains, with a view to advising Unesco on the means whereby Member States may play an active part in carrying out the proposed programme.

In view of the limited time at your disposal, it seems hardly possible for you to go into the details of the technical recommendations before you. But should you feel that you can approve the general conception of UNISIST and subscribe to its principles, I should very much like you, on the basis of a thorough study of recommendation 22, to put forward a resolution for the General Conference of Unesco proposing that machinery be set up within the Organization for the purpose of carrying out the UNISIST programme.

In that case, your deliberations on the first 21 recommendations, which will no doubt be recorded in your report, would provide me with guidelines both for the implementation of this programme and for the preparation of Unesco's Draft Programme and Budget for 1973-1974 and the Medium-Term Outline Plan for 1973-1978.

In any case, I should like to thank you in advance for your help in launching a programme which is marked alike by ambition and by caution; and to wish you all success in your work. A great scheme, whose approach and methods have been carefully studied, is submitted for your consideration. It is your deliberations which will determine whether it can be put into effect in the near future, for the advancement of science and the welfare of mankind.

Appendix B

Address by Mr. V. Ambartsumian,
President of the International Council
of Scientific Unions

SCIENTIFIC INFORMATION AND THE INTERNATIONAL COUNCIL OF SCIENTIFIC UNIONS

Science and scientific information are inseparable. The endless process of scientific discovery about the world consists in obtaining new information and new knowledge about nature and society with the aim of obtaining a deeper understanding and transforming reality for the benefit of mankind.

Using information which has already been obtained is only possible if there is a system of scientific communication. The more effectively such a system functions, the more rapidly does science develop and the more can people profit from its achievements. Constant improvement of the system of scientific communication, therefore, must be one of the most important tasks both for research workers and for those responsible for organizing scientific work.

Of course, scientific information is not only necessary for the development of science itself. It is nowadays an important prerequisite for the further development of any branch of human activity. Science occupies a special position simply because it uses already existing scientific and technological information in order to obtain new scientific information of value.

By its very nature, science is fundamentally international. The laws of science are in like measure proved and applied in the relevant branches of science in all countries of the world irrespective of their social and economic structure. Research workers and groups of scientists from various countries also make their contribution to science. This means that science, for its own development, needs a broadly based and rapid exchange of scientific information between scientists of various countries, together with ever-closer international co-operation in this sphere.

The need to perfect a system of scientific communication, which has been felt ever since science existed, began to make itself apparent even more markedly after the beginning of the present scientific and technological revolution. This is due partly to the enormous quantity of scientific information amassed through scientific research (each year, no less than 1 1/2 to 2 million articles on science and technology are published in journals alone) and partly to the ever greater economic and social importance attaching to the fastest possible introduction of scientific discoveries into industry. Science has changed from being the personal occupation of a small group of workers to a broad sphere of human activity, organized and directed like the major branches of the economy. To increase the effectiveness of the scientific information system, therefore, is to provide a great potential for increasing the productivity of research workers and an important means for speeding up the process of bringing the achievements of science to the consumer.

A system of scientific communication and its constituent part, a system of scientific information, are, like science itself, international by their very nature. Research workers address their papers, articles and books to all other research workers in the world who are engaged on the same or similar problems. And they themselves obtain fresh scientific information from the reports of their colleagues working both in their own country and abroad. This international exchange of scientific information is carried on by means of publications and literature. Over the last 25 to 30 years, however, scientific literature has played its communicating rôle in a less and less satisfactory way, forcing research workers to spend an ever-greater part of their working time not in creative activity, not even in reading publications of interest to them, but in searching them out from the sea of world scientific literature. As a result, in all countries of the world, special bodies and national systems for scientific and technological information are being established with the aim of assisting research workers in tracing the information they need. More and more material resources are being devoted to the development of such bodies. But because national scientific information systems are not connected with each other, they are,

to an ever-increasing extent, unjustifiably duplicating each other's work and are becoming less and less effective in meeting the demands of contemporary science. What is accordingly called for is the establishment of a world-wide system of scientific information consisting of national and regional information systems compatible and actively co-operating with each other.

The first steps towards the establishment of a world-wide system of scientific information were taken as far back as the 1850s. In 1858, the Royal Society of Great Britain began to publish an international bibliography of books and articles on mathematics and the natural sciences which was published up to 1900 under the title "Catalogue of scientific papers" and from 1901 to 1914 under the title "International Catalogue of Scientific Literature". Plans for the organization of a current bibliography of chemical literature were discussed in 1893 at a congress of chemists in Chicago and also at the first International Applied Chemistry Congress, held a year later in Brussels. In 1896, on the initiative of the International Zoological Congress in Zurich, a central bibliographical bureau was established, the Concilium Bibliographicum. This bureau began to issue a current bibliography of publications on zoology in the form of a journal and also on bibliographical cards indexed according to the Dewey Decimal classification. In 1893, the Belgian scientists, H. Lafontaine and P. Otlet, founded the International Bureau of Sociological Bibliography in Brussels and, two years later, the International Institute of Bibliography. It was their intention that this institute should become the world centre for the collection, classification and dissemination of bibliographical information. The executive body of this institute, the International Bibliographic Bureau, began to issue a universal bibliography on cards, known as the "Universal bibliographic directory".

At the end of the First World War, when international scientific links began to return to normal once again, the problem of perfecting a world system of scientific information once more became the focus of attention of the world scientific community. A proposal was put forward in 1919 at the very first assembly of the International Research Council - the immediate ancestor of the International Council of Scientific Unions (ICSU) - to establish an international council for bibliography and documentation. Although this proposal was not accepted at the time, the discussion regarding it certainly had a great influence on the development of international co-operation in the field of scientific information. In 1924, the International Institute of Bibliography was reorganized and changed from an association of specialists to a federation of national scientific information bodies. This organization was later (1931) renamed the International Institute for Documentation and in 1937 it became the International Federation for Documentation.

In 1931, the International Research Council became the International Council of Scientific Unions, comprising the following international unions - the International Astronomical Union (founded in 1919), the International Unions of Goedesy and Geophysics (1919), Pure and Applied Chemistry (1919), Radio Science (1919), Pure and Applied Physics (1922), Biological Sciences (1923) and the International Geographical Union (1923). The principal aims of these unions were:

- to facilitate discussions between scientists of various countries and find means of publishing the results of such discussions;
- to promote international congresses and measures to foster scientific co-operation between various countries;
- to help in the preparation and publication of bibliographies and encourage the free exchange of scientific information, etc.

Even at its foundation, ICSU was thus already giving serious consideration to the problems of improving the international exchange of scientific information.

The Second World War interrupted ICSU's activities for six years, but when the war was over the demand for the development of international co-operation in the field of scientific information began to make itself felt even more acutely. The reason for this was that the war years coincided with the beginning of the scientific and technical revolution, when science became one of the determining factors in the economic, political and cultural development of mankind. Furthermore, the end of the war saw the beginning of the world-wide historical process of national liberation from colonial oppression. Following the victories of national liberation movements in a number of Asian and African countries, dozens of new States appeared on the map and were faced, in all its starkness, with the problem of developing their national economy and culture in the fastest possible way. Solution of this problem in - historically speaking - record time is only on the basis of widespread use of the scientific and technical experience of more developed countries and skilful application of this experience in the conditions prevailing in each individual developing country. As a result, these countries increasingly began to feel the need to train national scientists and specialists as rapidly as possible.

In 1949, Unesco's Department of Exact and Natural Sciences headed at the time by Professor P. Auger, called an International Conference on Science Abstracting in Paris. This conference declared itself in favour of organizing the publication of a single international abstracting journal for physics. Representatives of nine out of the eleven Member States of ICSU took part in this conference. After the conference, ICSU established its Joint Commission for Physics Abstracting which was dissolved two years later, and in its place, in 1952, the ICSU Abstracting Board was established which, as is well known, has operated successfully

up to the present time and has played an important part in working out the proposals now being discussed for a World Science Information System. The Abstracting Board dealt at first only with abstracting journals relating to physics, but later on extended its coverage to journals in the fields of chemistry, biology, geology and astronomy.

In the middle sixties, ICSU took two important steps in regard to scientific information. In 1964, it established the Working Group on Tables of Critical Values. At the 11th General Assembly of ICSU (Bombay, January 1966) this Working Group submitted a resolution calling for establishment of a Committee on Data for Science and Technology on which the representatives of several international scientific unions would sit as well as one representative from each ICSU Member State. This proposal was accepted. At the same General Assembly, it was decided to set up a special committee to study the feasibility of establishing a World Science Information System based on ensuring compatibility between systems, both existing and in the process of establishment, for the collection, processing, storage and retrieval of scientific information. It was planned that the special committee should carry out its work in close contact with Unesco and other international organizations and also with the active participation of leading specialists in the field of scientific information.

Unesco was meanwhile engaged on a similar programme independently of ICSU and planned to hold an international conference in 1967 on problems involved in the transfer of scientific and technical information. One of the tasks of this conference was to have been the "establishment of a mechanism which would provide for the improvement of international exchange of scientific and technical documentation". The Director-General of Unesco was authorized to set up a special scientific committee to prepare for this conference. However, the considerable resemblance between the ICSU and Unesco programmes, and also the close co-operation existing between these organizations, made it possible for them to establish in 1967 the Joint ICSU-Unesco Central Committee to study the feasibility of a World Science Information System. This committee has carried out an immense amount of organizational, scientific and methodological work in which hundreds of eminent scientists, engineers and scientific information specialists from various countries have played an active part. The results of this five-year work are presented in summary form in the "Study Report on the Feasibility of a World Science Information System" which you have in front of you. In this "Study Report", the conclusion is reached that the establishment of a World Science Information System is both possible and necessary. The report also indicates the general outlines of such a system and the principal ways by which it might be established. You have to decide to what extent these conclusions and recommendations are well-founded and rational.

So ICSU has established two bodies, the Abstracting Board and the Committee on Data for Science and Technology, which deal exclusively with scientific information questions. However, this is far from being the only contribution which ICSU has made to solving current problems in this connexion. All scientific member unions of ICSU without exception are dealing to a greater or lesser extent with questions relating to improvement of the system for preparing and disseminating scientific information. For example, many scientific unions have set up special bodies for standardization of the symbols, units of measurement and terminology used in their respective sciences. The International Union of Biological Sciences has established permanent commissions for botanical and zoological nomenclature, and the International Union of Pure and Applied Chemistry and the International Union of Biochemistry have established a commission on biochemical nomenclature. As well as this, a number of scientific member unions of ICSU are doing a great amount of important work on preparing tables of scientific data, maps and atlases. Thus, the International Union of Crystallography has established a commission on crystallographic data, the International Union of Geological Sciences a committee for the storage, analysis and retrieval of geological data, and also a commission for a geological map of the world, the International Geographical Union a standing committee on national and regional atlases and the International Astronomical Union a commission for tracking the movements of the planets, a committee on satellites and so on.

The scientific member unions of ICSU regularly hold congresses, conferences, symposia and other kinds of meetings by which they further the international dissemination of scientific information through unofficial but, as special research has shown, singularly effective channels. In addition, most scientific unions make wide use of the formal channels of scientific communication. They publish scientific journals and directories, the proceedings of scientific meetings and other publications. Furthermore, some scientific unions have special commissions dealing with publications, documentation or bibliographical work. For example, the International Union of Crystallography has a Journals Commission, the International Union of the History and Philosophy of Science publications and bibliography commissions, the International Union of Physiological Sciences a publications commission, etc.

In this way, scientific information work in its various aspects is a major ingredient of the activity of all scientific member unions of ICSU and is part of their very being. The world scientific community and, hence, ICSU, is deeply interested in improving the existing system of scientific communication. It is for this very reason that ICSU and Unesco together have launched the project for establishing a World Science Information System.

Many very varied difficulties resulting from economic, historical and other circumstances will be met with as we move forward towards this system. But we should not fear these difficulties and should resolutely tread our intended path if we wish to make it possible for the achievements of science, combined with the growing social transformation of society, to create worthy conditions of life for mankind, free from the threat of hunger and wars.

In establishing the World Science Information System we should not base ourselves solely, or even mainly, on the interests of the most developed countries of the world. The economic and cultural backwardness of most Asian, African and Latin American countries is a heavy burden on the conscience of all nations of the world. The historical duty of all countries of the world is to assist developing countries by all available means to eliminate in the shortest possible time the gap which separates them - in economics, science and culture - from the most developed countries. There is even less reason for complacency over the still evident trend towards a further widening of the gulf between rich and poor countries. All international projects, therefore, carried out under the auspices of such organizations as ICSU, Unesco, UNIDO, WHO, etc., including the programme for establishment of a World Science Information System, must accord a central place to comprehensive action to promote the economic and cultural progress of developing countries. This means that the World Science Information System must also cover industry, agriculture, building, medicine and other sectors of paramount importance to developing countries.

The representatives of international scientific unions taking part in this conference as specialists and experts, and also the representatives of national academies of sciences, will, I think, have many valuable observations and suggestions to make on the organization of UNISIST. For my part, I would particularly like to emphasize the ever-growing need for ready-made digests and reviews of scientific information concerning separate branches, disciplines and interdisciplinary problems. In the Study Report submitted to us by the UNISIST Central Committee, it is stated that these reviews, which evaluate the primary data, cannot avoid being to a certain extent subjective. It is therefore all the more necessary that such reviews should appear regularly in various countries and that the reader should have an evaluation of one and the same data from scientists of various nations, various scientific schools and having various approaches to the problems.

One can name only a small number of sustained attempts in this direction. Perhaps the most successful is the journal "Achievements of the Physical Sciences", published in the Soviet Union, and the annual reviews of various sciences published in the United States of America. It is obviously necessary, however, to find the most suitable form for publishing such reviews, to spread this work systematically among scientists of various countries, and, not least, to devote more money to it.

The great progress which has been made over the last decade in the field of computer techniques and reprography gives us reason to hope that many difficult problems concerning the gathering, processing, storage, retrieval and dissemination of scientific information will be successfully solved in the very near future by recourse to the most recent technological methods. But many such problems will remain which, for the time being, no machines, not even the most sophisticated, can solve. These problems must be solved by people, scientists and specialists. It is therefore no good just sitting waiting for the time when computers and other technical equipment will make it possible to establish an "information heaven" on earth.

We must strive resolutely further to improve the methods and machinery for scientific information work, particularly in regard to the manner in which it is organized on an international scale. The International Council of Scientific Unions will do its utmost to co-operate in this task.

Appendix B

Science and information in prospect
by Pierre Piganiol

The art of prospective studies is a difficult one. It is not enough to extrapolate trends and foresee the consequences of present tendencies. It is necessary to discover facts that "contain the seeds of the future" and to imagine what their fruits will be. In other words, if the present situation may be represented as a "dynamic system" with its own characteristic elements and between them, interactions, then the probable future states of this system must certainly be studied by extrapolating its dynamics, but the essential thing is to foresee its structural mutations. The approach in prospective studies is to try to imagine desirable futures and ways of allowing them to come into being.

Consequently, a prospective study cannot be the work of one man alone: it calls for surveys and comparisons between the points of view of specialists in many fields. This explains the limitations of the present account, which is much indebted to very well-informed outside opinion gathered, however, from far too few sources. It has therefore but the modest ambition of lighting the way for subsequent discussions.

I. LOOKING AHEAD AT THE DEVELOPMENT OF SCIENCE

The industrially developed countries have been steadily increasing their efforts to create new knowledge and to apply that knowledge. Research and development (R&D) expenditure is more or less everywhere moving towards the mark of 3% of the gross national product. Fundamental research, which is aimed at simply adding to the store of knowledge, is also growing in absolute terms and, depending on the country, accounts for between 8 and 25% of the overall research effort. By simple extrapolation, one arrives at the conclusion that the total fundamental research effort may increase by between 30 and 50% in the next ten years, which will give rise to a corresponding increase in the volume of publications. In reality, this figure is an underestimate. It does not take into account the numerous countries, at present at an early stage of industrialization, which will enter the arena nor the pressure generated by the need for new knowledge necessary to control the technical developments occasioned by a population which has become denser, on account of urbanization, and more active, as a result of a higher standard of living. It also ignores the fact that the tools of research, which are numerous, accurate and often automated, make work speedier and more effective. This can be measured moreover by the increased cost of research workers, which in many fields has gone up by 50% in ten years. For all of these reasons, the graph of the fundamental research effort does not seem likely to level out for several decades. It will certainly happen one day, but it is becoming doubtful whether the limit will be higher than a level expressed by a fairly large multiple (approximately ten) of the present level. Without the proper methods, the "inventory management" of accummulated knowledge, already difficult today, will become well nigh impossible.

To these quantitative considerations a few remarks may be added concerning the content and strategy of research. Firstly, with the progress of knowledge, each field of science is becoming more and more dependent on the others; the term "multidisciplinary" often in fact refers only to the simple reality of the increasingly close interdependence of the various disciplines. Secondly, the structure of knowledge no longer lends itself to a linear representation (Auguste Comte's classification) nor even to representation as a "tree". To give a formal representation of this structure now requires the employment of the notions of networks, grids and systems. We shall see further on that this trend has considerable implications for scientific and technical information. For the moment let us note simply that the strategy spontaneously adopted by scientists is based upon an intuitive vision of the structure of science which, sound as it may be, may well prove inadequate as that structure becomes more complex. The very structure of scientific information should help to give a clearer picture of the complex of knowledge so

that an optimal strategy can be deduced from it. Scientific information cannot be limited to a passive rôle: its rôle as a "heuristic aid" cannot but develop with time.

From these remarks we shall subsequently deduce the probable development of the rôles of documentation and scientific and technical information. But it would be prudent to begin by putting the foregoing ideas to the test of actual circumstances by asking in what way scientists today experience the need for information. Surveys of this kind have recently been undertaken by scientific documentation services to enable them to satisfy their clients' requirements as well as possible. The results are often staggering; a typical reply, scarcely exaggerated, would be: "I don't need any information; in my advanced field I am in constant and direct relationship with my colleagues working in the same field; I am familiar with their projects and they communicate their results to me long before they are officially published... and all the rest is of no importance "!

Faced with such an attitude one might wonder why these advanced research workers feel the need to publish! And yet there is a certain amount of truth to what they say. The research worker in advanced fields is very sensitive to the time factor. If his strategy were dependent on knowledge gleaned from published texts alone, he could be somewhere in the region of two years behind in relation to current research. And he would be much more behind if he had to go through the normal machinery of documentation in order to get hold of these texts. The first point to remember then is that it is necessary for the mechanisms of documentation to respond to demand very quickly. But the negative attitude of research workers towards documentation has a second origin which may be represented diagramatically as follows:

Research work of team A
↳ Results obtained by team A
↓
Knowledge content of A
↓
Publications of A
↓
Documentation relating to the publications of A
↓
Putting into the form of scientific and technical information
↓
Transfer to team B

Team B, in order to get at the knowledge acquired by A, must follow the sequence in reverse order, tracing the publications by means of the image created of them by the information service and then, by means of the publications, rediscovering the complete thoughts of A. If it is obvious that information is not equivalent to knowledge, it is also true that knowledge cannot be entirely reduced to publications. A therefore desires to meet B. The point to remember is that there is here a considerable problem that future documentation must resolve.

We shall now point out the errors that the advanced researcher commits in adopting the attitude that we have - in a somewhat over-simplified form to facilitate comprehension - indicated above.

He claims first of all that he can get directly in touch with his colleagues. This presupposes that there are few of them and that the cost of journeys to congresses or to make personal contacts is no object. This might be so for example in the case of very original experiments in the field of high energy physics but seems to me to be excluded in the case of new reactions of organometallic compounds.

This attitude also presupposes that the value of results obtained in the past is almost negligible. Such may be the case in certain fields in which work has only recently begun, but is otherwise rarely the case. Here is an example from my own recent experience. Certain recent and interesting findings in modern quantum physics suggest to me a hypothesis on how acetylenic compounds arise in plants. It is quite true that I have to carry out experiments which no amount of documentation will help me to set up, but it would be wrong to think that I can get by without drawing up a table of those natural acetylenic compounds which have already been catalogued or that I can ignore the hypotheses that have been advanced to explain their formation. The formulae of hundreds of compounds have been established by research workers, many of them now no more!

In short, although there may be some justification for the attitude that we are complaining of, we still have no qualms in saying that it also stems from a certain snobbish scorn for the labours of those who have built up the files of data which serve as a basis for laboratory work, and that this same snobbery also overlooks the importance of synoptical works which could not exist without subtantial documentation.

If we have dwelt at some length on the somewhat exaggerated attitude of certain scientists, it is firstly because it constitutes an obstacle to progress in the field of documentation, but mainly because it reveals the lines along which scientific information should develop. We believe in fact that this attitude will not survive the test of circumstances, but we must make sure not to let it appear to have had some shred of justification by failing to resolve the problems to which it owes its existence.

II. LOOKING AHEAD IN APPLIED RESEARCH

Man digs down into the depths of his knowledge in order to solve the problems posed by his needs. It would be most surprising if the pattern of his needs coincided with the system of classification

of the branches of knowledge. It would even be surprising if a problem of a practical nature could be solved with the help of only one single field of knowledge, one single discipline.

Applied research is therefore by nature multidisciplinary. Furthermore, it is of no consequence to it whether the knowledge in question is new or old. We are dealing here with a sector in which information comes into its own, and it is not surprising to learn that here at least the need for documentation has never been denied. Let us examine two of its specific characteristics.

The first relates to the multidisciplinary nature of information. It also concerns fundamental science and a part of what follows could have been stated in the previous paragraph. Communication channels use specialized languages. The complexity of modern knowledge makes these codes very accurate and very selective but scarcely capable of being used by those who are not familiar with them. To use an image from radio engineering, communication channels have become considerably more numerous, but each of them is operating on a greatly reduced wave-band. Translations of codes have become necessary, and a system of science information which does not take account of this fact is doomed to failure.

My second remark concerns the exhaustive nature of information. Applied research is linked to a market, and it is often necessary, if only in connexion with patent rights, to be familiar with everything that has been written in a field, even if it has not been used, and even, in extreme cases, if there were mistakes in the article. Documentation for applied research must therefore also reflect the "antecedents". Whatever the problem, documentary research in this field is very broad and multidisciplinary, perfectly up to date and exhaustively retrospective.

Pure scientists often consider that documentation is essentially meant to serve applied research. We have stated why this idea appears to us to have little foundation; the future will demonstrate how fragile it is.

Conversely, research workers in industrial laboratories sometimes, albeit more and more rarely, fall into the error of believing that the most advanced trends in fundamental research can be ignored. This is a very big risk to take so lightly; the optimization of applied research strategy must take into consideration every development in the forefront of knowledge. The choice of topics and solutions in fact presupposes an extremely thorough analysis of what will one day be possible. But this is only one particular aspect of a more general problem: irrespective of whether or not they are scientists, do those who have certain decisions to make need scientific and technical information, and if so, which?

III. THE USERS OF SCIENTIFIC AND TECHNICAL INFORMATION

We come now to the crux of the problem. Science has come to occupy a position of major importance in the life of the community today. Science is responsible for all those innovations which have completely changed our lives, affecting equally our life-expectancy, the speed of our vehicles, our means of communication and the processing of our information. After a period during which every new discovery was systematically exploited, since each one represented a further step forward, we have now amassed such an arsenal that we are faced with the necessity of choice, since there exist several ways, with different costs or different "side-effects", of attaining the same goal. Derek S. Price has stressed this fundamental difference between science and technology: whereas every law of nature has a chance of being discovered one day, although we may not know when nor in what form, not every technique has the same chance of coming to light, and our ability to control progress depends on society's making the right choices. The mechanisms of the development of society have not always in the past taken into account the side-effects which make themselves increasingly felt as our civilization becomes more densely-populated and more active. We should therefore be witnessing a trend towards increased use of scientific and technical documentation in all those sectors which are responsible for the future and, in particular, in company boardrooms, ministries and party headquarters. In fact, the opposite is happening, although this phenomenon has not been properly studied. It would appear that the people in these various positions of responsibility consider that they have no need to think for themselves on the basis of assimilated information when they can refer to experts or even advisory committees. This situation is more clear-cut in some countries than in others, but there are probably very few which are not, to a greater or lesser extent, affected by this crisis. This is the result of the excessively rigid division between scientific, literary and legal cultures. All the signs indicate that this phenomenon will last a good ten years more, but the tide cannot help but turn, and the increasing number of popular science magazines being published in certain countries indicates that the process is already under way, in spite of the fact that there have been no corresponding changes in secondary education

Moreover, our modern societies will try to develop more rationally, with a more subtle awareness of the interactions between the various processes at work within them. Although methods of model-making or systems analysis may be subject to constraints which, for the time being, prevent their results having any normative value, we can nevertheless be sure that they will have a major part to play in guiding and in providing a basis for our deliberations; and these methods demand and absorb a great deal of information, thus highlighting its importance.

IV. On the basis of the foregoing we may perhaps be able to draw a rough outline of future needs in the field of scientific and technical information.

1. "Inventory management" of accumulated knowledge will become an increasingly important task for our scientific civilization.
2. Such management requires a permanent inventory, followed by a classification which will never be definitive: knowledge must be regularly reclassified as new links are discovered between the various fields of science and technology.
3. This reclassification must be accompanied by quality control, to ensure that errors are eliminated and only the most reliable data retained.
4. Inventory management must also include the distribution of various items from stock to various users. The only difference between this and a stock of material objects is that distribution does not alter the stock in any way.
5. Identification of users will be an increasingly important task. A scientific civilization is bound to be inefficient if information does not circulate in the correct manner amongst research workers and between research workers and all those who use or transform knowledge (teachers, engineers, etc.)
6. Information should reach scientists in such a form that they can assimilate knowledge which does not relate to their specific field and are helped to approach their research from a new angle.
7. As for other users, it is important that information should reach them in a code they can understand, which often means that a sort of translation into a suitable language will be necessary.
8. Knowledge is by nature international. Any coherent science information system must overcome language barriers; these barriers will become an increasing hindrance as more and more countries start playing an active rôle in the creation of knowledge.

The above points express two equally fundamental but very different truths. The first is that knowledge plays an essential rôle in the modern world but can no longer be easily kept under control unless it is continually classified, arranged and marshalled in order to facilitate the task of those who advance knowledge and those who use it. The second is that the natural languages and their various adaptations constitute the medium - taking many forms - for the communication of knowledge. "Inventory management" of the stock of knowledge is therefore inseparable from familiarity with the rôle and nature of the linguistic medium, or rather media, which convey knowledge. It is remarkable that the problems of documentation should be so acute at the very time when everyone is discussing the interactions between science, technology and society and at a time when there is passionate interest in the problem of "languages".

V. AN ALTERNATIVE APPROACH

In all of the foregoing, we have started off from an analysis of the various needs. A second possible approach would be to see how the documentation and science information system is functioning at the present time and to study its difficulties and trends. This exercise is complementary to the previous one. We shall restrict ourselves to a few important points:

1. Faced with the growing mass of documents to be taken into consideration, scientific documentation has turned to the rational use of computers. There is every reason to believe that this trend will become more and more pronounced, involving the increasingly frequent use of teleprocessing, time-sharing, visual display terminals, printer terminals or conversational terminals.
2. Before computers can be used, a great deal of preparatory work must first be carried out; steps should be taken to prevent this work being duplicated.
3. This preparatory work comprises a great variety of features: analysis of the document; reduction of the contents to information that can be processed; preparation of the software needed to be able to converse with the machines, etc.
4. It is based on research which has not reached a very advanced stage and which concerns: the logic of analysis; the structure of knowledge; the rules governing establishment of thesauri; the nature of an optimal documentary language.

These last two points (3 and 4) will require more and more investigation. Research, in particular, will help to identify a set of compatible or incompatible solutions.

5. There will be growing awareness that certain preliminary operations can be done more easily in the original language and that, on the other hand, the use of a documentary machine language should make it possible, throughout the course of processing, to escape from the diversity of natural languages, while using these languages for communicating with the computer.

Observation of the way in which documentation systems function thus tends to bring out two essential points: the use of computers is spreading; absolutely necessary research is developing at an increasing speed.

The use of computers necessitates very sophisticated and therefore costly software. It would be more economical and more efficient to prepare this software by means of a co-operative effort, thus

effortlessly ensuring that the corresponding sub-systems will be compatible.

On account of the complexity of the research involved - since it is always multidisciplinary - and because it always has to take into account the structure of the various natural languages, there would be every advantage in co-ordinating it at the international level. This would be both a guarantee of quality in that all aspects of the problem would be taken into account and it would be a guarantee of speed in a field in which the demands of action do not allow a long time to elapse before essential findings are made available.

These, then, are two important aspects of the problem: both of them point to the need for concerted world action.

The structure of the documentation network

It is interesting to study the way in which national and international networks are formed. We are living at an exciting time in this respect, a time of hectic activity and also of anarchy.

Due to the pressure of needs and the difficulties of the tasks involved, numerous links are being established between documentation centres at national level. These are voluntary arrangements which seldom aim to distribute tasks more fairly and under which everyone seeks to do the maximum and to use to the maximum what the others are doing. This attitude has many advantages but it also has its dangers: courses of action are decided at the level of sub-systems without overall co-ordination; moreover, the time will inevitably come when the economic pros and cons have to be weighed, and courses adopted in the first flush of enthusiasm for new endeavours will prove to be impracticable once work is under way. Indeed, people are often lured into extra efforts by the attractive idea of apparently efficient, advantageous co-operation, without stopping to think where the resources are to come from. These efforts cannot go on for long without the necessary backing, and often end with the bitter taste of failure. In short, the frequent lack of a national "centre" where the problem of science information can be dealt with in its entirety may be sorely felt.

In addition, under the pressure of needs, international links are being formed between parts of the network in one country and those in another. This trend is bound to develop: it too brings with it many potential advantages, but it is also in danger of getting out of hand and leading to disorder. It will be objected that this development, the result of a variety of separate initiatives, is a natural process like conception. This is to forget that every seed is programmed, whereas there is no programme inherent in disorder. It will be necessary therefore to give an increasing amount of thought to the ultimate end of our efforts and the adequacy of our means.

Awareness of the issues

To the preceding remarks must be added an observation: those most affected by the problems of documentation have long been aware of the scale of the issues at stake. Unfortunately, their legitimate demands have often been felt by outsiders to be a campaign aimed at perpetuating and consolidating their rôle. There has even been talk of a "pressure group" of documentalists. These same documentalists are quite rightly convinced that their work can facilitate enlightened decision-making and consequently help to prevent disastrous mistakes. They are inclined to think that the failure to recognize the importance of documentary work is but one aspect of a tendency to take the easy way out: it is easier to remain ignorant than it is to learn. There is a fallacious and dishonest intellectual comfort to be derived from refusing to familiarize oneself with all the facets of a complex problem: it is others who have to bear the consequences of such inexcusable irresponsibility.

This conviction produces justified protests from documentalists, merging with the complaints they make concerning their status, which is often subordinate. These two types of complaint should not be confused and it should not be thought that documentalists are making demands merely for the selfish - but legitimate - satisfaction of a better condition in life.

One simple and essential idea emerges from even the most elementary forecast, namely that as long as specialists are the only ones who are aware of what is at stake, the chances of success of rational and effective international action will remain slight.

Conclusion

It thus transpires that Unesco has a vital rôle to play: from its vantage point it should shed light on the problem, catalogue the difficulties, suggest solutions and ways in which they might be carried out. This is the underlying reason for our coming together at this international congress of 1971, and this date should mark a decisive turning-point in the nature of the efforts made by men to master the content of knowledge and to manage the accumulated stock of knowledge in the material and cultural interests of mankind.

This turning-point in the history of documentation should be marked by the following new features:

Firstly, there should be a fresh awareness, on the part of governments, of the importance of what is at stake. We can only rejoice in the fact that the most important international cultural organization has taken this problem in hand. This commitment has a symbolic value, and is almost certain to be understood.

Secondly, there should be established a solidarity amongst all those who work in the field

of documentation and even between them as a body and their clients. This solidarity, if interpreted aright, should make it possible for every line of development to be pursued not for its own sake but as part of a broader system.

The complexity of the problem should also be recognized, and, as a corollary, over-simplified solutions with too much emphasis on centralization, or which are too authoritarian, should be rejected: a structure should be sought for the system which will be effective in terms of work without increasing the number of new constraints. A "good" system is one which accepts reality in all its many shapes, and does not seek to over-simplify it the better to dominate it; between the elements of such a system should exist all the necessary relations - and the necessary constraints - and none but those.

Such an approach suggests a great variety of new mechanisms; it necessitates research - disinterested, objective and international. It is to be hoped that the conference will sketch out a picture of these mechanisms and that some of them will already at this stage be given a precise form. It is obvious that we are only at the beginning of a long job; it would have been wise to begin earlier, but the climate of opinion was not ripe. In any case, it is no use criticizing past sins of commission and omission. The essential in a prospective study is not to analyse the facts of significance for the future, indispensable as that may be; but to affirm a lucid determination to give substance to choices freely and objectively arrived at.

Appendix B

Scientific Information Today - A Scientist's View
by Harrison Brown

In view of the fact that the scientist is both the sole generator and the major consumer of scientific information, it is only proper that we open this meeting with a discussion of scientific and technical information from a scientist's point of view. What is it that a working scientist most wants from a scientific information system? What is it that he most needs?

The key to the answers to these questions is to realize that the scientist is impatient. When he discovers something he wants to tell the world about it immediately. When he has need for a piece of information, he usually wants to be provided with it on the day before yesterday. He does not want to wait, and if forced to wait for too long a time he will often find some way of getting along without the piece of information he desires, sometimes to the detriment of his work. He cares little about the mechanism by which he gets his information as long as he gets it. He couldn't care less whether the mechanism is governmental or extra-governmental, whether it makes money or loses money, whether the information is printed, taped, computerized or given him by voice over the telephone or at a meeting. The important thing to the scientist is that he gets the information he needs. When compared with the total costs of doing research, costs of providing information are small, and the returns on the investment can be very large.

With respect to publication, the scientist views the final publication of a piece of research as a necessary formality. He has already informed his peers of his results many times in meetings, in correspondence, at seminars, in lectures and in "Letters to the Editor". Having informed those persons who, in his mind, are the important ones, this last step of writing for publication is undertaken as a necessary part of the ritual. The artist signs his painting, when he has completed it to his own satisfaction. In like manner the scientist writes his paper and bequeaths it, for what it is worth, to posterity. In doing so, he recognizes that from a long-range point of view this is a necessary aspect of scientific communication. He recognizes as well that his publication will permit others to replicate his work if they are so minded, to validate his findings, and to recognize the significance of his contribution. On a philosophic level, he has a pretty good idea of where his work fits into the advancing front of knowledge, and is gratified when others agree and disappointed when they do not.

However, from the short-range point of view, the scientist is usually satisfied that his responsibility for communicating new information to his peers has already taken place by the time of publication. He has already informed the members of his peer group, both at home and abroad, by correspondence, by reporting at meetings and congresses, and in large measure they have already passed judgement.

With respect to his obtaining needed information, the working scientist's needs fall into three broad categories. First, it is necessary for him to follow closely developments in his own field of research. For the most part he does this in a more or less personal way through correspondence, seminars, meetings and visits to laboratories. Most scientists supplement this by scanning tables of contents of journals in their field, by scanning appropriate sections of abstract journals and by securing and reading the full texts of those articles which seem important to them.

Second, it is often necessary for a scientist to obtain information in an area of science quite removed from his own. In such instances he wants to find the information quickly and, equally important, he needs some indication of the reliability of the data, for often he is in no position himself to judge. In these circumstances he needs every aid he can obtain ranging from reliable indices and abstracts to critical reviews of high quality.

Third, it is important that the working scientist follow in a broad way general developments in science, for not infrequently findings in one field have bearing upon another. Often he follows these general developments by reading review articles of the more popular types, such as those in the Scientific American and The New Scientist and by attending lectures and seminars.

Although the working scientist prefers not to have to worry about the mechanisms for storing, retrieving, consolidating and evaluating scientific information, the complexities of the problem have forced him to become involved in such matters in his own interests. There are, it seems to me, several reasons for this. First is his concern for the quality of the information and the reliability of the data offered him. Only scientists can maintain their discipline (or, if you prefer, their "interdiscipline"); others cannot do it for them. This is the reason, it seems to me, behind the growing popularity of information analysis centres.

The second reason is in part concerned with the scientist's self-interest, and in part with his public responsibility. As we invest sizable funds, both public and private, in the development of these large information retrieval systems in the sciences, we must ensure that they return benefits to science. Their design, their logic, their operation must be responsive to the needs of scientists, and not to the preconceptions of others who would speak for them. Scientists must become involved if we are to build on rock, not sand.

The third reason is that of self-preservation, or, if you prefer a less dramatic phrasing, the preservation of the orderly growth of scientific knowledge. Steadily increasing support of science and technology and steadily increasing numbers of scientists have resulted in an output of technical articles, books, abstracts, review articles and compendia of various sorts which has already reached avalanche proportions and which threatens to become unmanageable.

Starting in 1665 with the publication of the Philosophical Transactions of the Royal Society of London, which is today the oldest surviving scientific journal, the number of journals reached ten by 1750. Shortly thereafter growth took place more rapidly and by 1830 some 300 periodic scientific publications were listed. Realizing that no scientist could possibly read or even scan all that was being printed, our German colleagues invented the abstract journal. Since that time abstract journals have proliferated as rapidly as have the regular journals. The number grew from 1 in 1830 to 300 in 1950 at which time the situation with respect to abstracts had become as complicated as the situation with respect to regular technical articles had been in 1830.

Early in this period of proliferation, the Royal Society of London initiated its Catalogue of Scientific Papers, at the instigation of one of my predecessors, Joseph Henry, a comprehensive effort to index the international record of scientific publication. Later the Royal Society undertook a still more ambitious effort known as The International Catalogue of Scientific Literature. National committees in 17 disciplines of science working under a common classification scheme, contributed index records of their countries' publications. In the years 1901-1913, the International Catalogue published author entries to 853,057 papers in the 17 fields, a most respectable co-operative accomplishment. Organizational and fiscal problems caused the International Catalogue to become a casualty of World War I. Incidentally, the total entries accumulated in the International Catalogue by 1913 amounts to three years' production of scientific and technical work at today's rate of research activity.

Immediately after World War II, the British again took the initiative by sponsoring The Royal Society Scientific Information Conference in 1948. Here, the concept of an international information council with national participants was advanced by Professor A. F. C. Pollard. Ten years later, 1958, at the International Conference on Scientific Information, held in Washington, W. Chamberlain of New York University and Paul Bouquet of the Institut Pasteur independently proposed the establishment of international centres or institutes.

Today the scientific and technical worker is confronted by some 35,000 periodic scientific and technical journals which publish nearly two million articles each year, written by some 750,000 authors in as many as 50 languages. If the number of scientists and the publications they produce continue to grow and proliferation of publication takes place in the future as rapidly as it has during the past 250 years, in another 50 years the working scientist might well have some eight million fellow scientists in the world with whom he can try to communicate and he might have a pool of 350,000 scientific and technical journals from which to make selections for his own working library.

Are such numbers fantastic to contemplate? I think not, particularly when we realize that the technical problems which require solution in the world are enormous. As man has moved further and further away from the world of nature from which he emerged and into the artificial world of industrial-urban civilization, his problems have multiplied rather than diminished. He is constantly presented with problems of increasing magnitude which require new knowledge for their solution. As the problems multiply in numbers and seriousness, and as solutions become more urgent, our needs for research and consequently for scientists and technically-trained people will continue to increase on a world scale.

These problems have not gone unnoted by scientists; indeed it was the recognition that communication practices in world science were under increasing stress which led to UNISIST. In September 1961, a Pugwash Conference was held in the United States to discuss possible future areas of international scientific collaboration. Particular stress was placed upon those areas of co-operation in which scientists from the countries of Eastern Europe and those from the West might most effectively work together. The recommendations which emerged were numerous and embraced virtually all major areas of scientific activity. Today, almost exactly ten years later, it is exciting to note the

large proportion of those recommendations which have been acted upon.

One of the recommendations dealt with the problem of scientific information. Academician M. M. Dubinin from the USSR and Professor Bentley Glass from the United States, a chemist and a biologist respectively, jointly presented a paper in which they viewed with alarm the exponential growth of the scientific literature. Stressing the near-impossibility for most research institutions to have direct access to all of the world's scientific literature, they recommended the establishment of a world centre, a vast storehouse for the world's scientific literature, from which the working scientists could retrieve information at will.

In 1963 I had the privilege of introducing this subject to the General Assembly of the International Council of Scientific Unions in Vienna. In 1964 at yet another Pugwash Conference, held in Karlovy-Vary, Czechoslovakia, Dubinin and Glass again stressed the urgency of the problem and repeated their 1961 recommendation. The following year I discussed the need for a study of this problem with Professor Alexei Matveyev of the USSR, then Assistant Director-General of Unesco for Science and suggested that Unesco might wish to finance a study to be undertaken by ICSU. Later that year, at a Pugwash meeting in Addis Ababa, Matveyev and I agreed in principle that the study should be undertaken jointly by ICSU and Unesco, thus bringing to bear upon the problem the resources and expertise of the scientific community and of information specialists at both the governmental and non-governmental levels. Shortly thereafter at its eleventh General Assembly which was held in Bombay in 1966, ICSU approved a proposal to study jointly with Unesco the feasibility of a world scientific information system based upon achieving compatibility among existing and prospective programmes related to the storage and retrieval of scientific information. This proposal was approved at the fourteenth General Conference of Unesco, and a joint working party was established to develop the terms of reference for the proposed study.

The working party which met in Paris in January 1967 recognized that the situation with respect to the prospects for international co-operation in scientific information had changed greatly since World War II. First, there appeared to be universal agreement that the organization of scientific information services solely by academic disciplines is anachronistic. The computer-based retrieval systems under development or in operation in large supra-disciplinary fields (physics, chemistry, biology, medicine) had acquired the capability of generating products which can be repackaged in response to specified needs of an interdisciplinary nature. The rigidity of the traditional publication systems of the past which inhibited imaginative response to contemporary needs was in great contrast to the flexibility of mechanized systems of the present and the future.

A second consequence of computer-based solutions to scientific information processing was perceived to lie in the area of economics. Economic determinism was clearly driving some of the larger systems toward the internationalization of their input practices with resultant cost sharing. Each of the supra-disciplinary systems in its own way is responding to economic pressure to reduce its input costs through international agreements.

A third consideration lies in the discipline of computer technology. It has been said that the computer will play in the twenty-first century a pacific rôle comparable to that of the Catholic Church during the darkest of the Middle Ages. Certainly there is evidence that the need to subscribe to a common systems discipline is making academic many of the classic arguments which have plagued efforts at co-operation in past years.

It is doubtless true that these same circumstances contain in themselves the seeds of urgency. If we cannot seize the opportunity offered by this moment in history to eliminate some of these classic barriers to the free flow of scientific information, if we allow systems to develop in isolation one from another, and countries to persevere in their differences rather than to standardize their practices, we shall be compounding the problem for future generations.

Our study has been completed; our recommendations are before you, and you will be giving them your active consideration over the next few days. In placing them before you, I ask your indulgence while I make some personal observations. As I mentioned earlier, I have now been associated with questions of scientific information for some ten years, first as a Pugwash participant, next as an ICSU officer and lastly as Convener of the UNISIST Central Committee. Yet by training and profession I am a chemist, not an information scientist.

As a scientist, I have been exposed to a liberal education over these last ten years. Some of my preconceptions have been swept away by the floods of evidence; others have been confirmed. I have learned much that I had not known before, and relearned a number of things I had forgotten. All in all, it has been a chastening educational experience. I do not expect in the future to remain as intimately involved in the complexities of scientific communication as I have been during the past few years and I should like to leave with you, as a legacy of good counsel, a little of the knowledge and wisdom I believe I have gained.

First, I believe we should lay to rest now and for all time the concept of a gigantic monolithic repository and service station for the totality of the world's scientific knowledge. Derived possibly from the conception by the late H. G. Wells of a "World Brain", this concept is reproposed at irregular intervals as the solution of automatic choice. It was present in the first Pugwash considerations, and it is still being proposed today. By the time the UNISIST study was being planned,

however, realism prevailed over fantasy, and instead of the monolithic institution or even the single centrally-managed system, we defined our objective as a "flexible network based on the voluntary co-operation of existing and future autonomous information services".

Some reflection should convince anyone why this must be so. A single centralized world science information centre is today not a feasible political concept. No authority exists which could manage it. It is not an economically viable concept; the magnitude of its costs would terrify its supporters. It would constitute a logistic impossibility; the traffic patterns would be more complex even than those of my native metropolis, Los Angeles. And I suspect, on the basis of what I know of science and scientists, that it would probably constitute an intellectual impossibility. Although scientists understand each other across national boundaries better than do most groups, we are still far removed from a "One World" of concepts and classification in the universe of science.

It is obvious, just as science is pluralistic, and must reflect the great variety of approaches to new knowledge, and as countries have differing economic and political backgrounds, so we must live with and accommodate to a great variety in the organization of information services for science. The truth of this came upon me, and, I think, to other members of the UNISIST Study Committee, as we reviewed the surveys which had been prepared, and heard reports from the representatives of the many non-governmental organizations which attended our meetings. We were astounded at the enormous number and variety of information services, within disciplines, across disciplines, mission-oriented, literature-based, data-based, governmental, commercial which have grown up to serve science. And, we were equally surprised by the sheer number of professions involved in this service, all operating under the general rubric, "information scientists". Editors, abstractors, indexers, librarians, systems analysts and operators, linguists, documentalists, publishers. The list is a long one.

You will note, in our report, our concern for standardization. I do not wish this to be misinterpreted. We recognize the values to be found in variety; science has many faces and they must all be served. We do not propose, therefore, to standardize these services, but to standardize the conventions by which the services can interchange information. Because we succeeded in standardizing the 26 letters of the Roman alphabet does not mean that we must standardize the uses to which they are put. And the fact that we wish to standardize the conventions by which the 26 Roman letters can be converted into the 32 Cyrillic letters (and vice versa), does not mean that we propose standardizing a science information service using either alphabet.

I should like to observe (and this arises also from a consideration of the multiplicity of services and of groups operating them) that our group quickly learned that the real problems underlying the improvement of science information services lie in organization and management, not in the promotion of technological innovation. This is not to say that a research and development frontier for information science is unnecessary, or that it has not already made significant contributions to the improved handling of scientific information. It is rather that the accomplishment of fundamental improvements constitutes more a political than a technical problem. I use the word "political" here in its broadest sense. Were the public policy of the countries represented here to be committed to the improvement of services along the lines we proposed, we should have a start. We then have the problem of convincing people, and through them the communication institutions they control that the organization and management of their work along the lines of increased co-operation will improve their service. We have the problem of educating the present and the future generations of scientists to use the improved services.

Indeed, it has been said that there are no problems but "people" problems. I am reminded that toward the end of our study, as we were discussing the possible extension of UNISIST to the Social Sciences, the distinguished representative of the principal non-governmental organization, the International Committee for Social Sciences Documentation, Professor J. Meyriat, observed that he would be pleased to extend the definition of the Social Sciences so that they might contain UNISIST. I should not proceed, either, without paying my respects to our East European colleagues for their definition of the area of "informatics" or "information science", with which we have been dealing. A report circulated by the representative of the Council for Mutual Economic Assistance (CMEA) at our last meeting contained these words: "Information science is a discipline belonging to social science, which studies the structure and general characteristics of scientific information, and also general laws governing all scientific communication processes".

We are agreed, then, that communication is a social function of science. The information scientists and technicians are responsible in large measure for the operations of the institutions and services which are ancillary to the performance of this function, and we, as scientists, owe them our gratitude.

However, let me repeat my opening words: "The scientist is both the sole generator and the major consumer of science information". It became abundantly clear during the course of our study, as others have found before us, that the scientist divorces himself from responsibility for the planning and operation of his information services at his peril. Repeatedly we discussed the need for scientist participation to maintain quality control of the information from the point of its

generation to its consumption. Analysis, compaction, evaluation and the synthesis of new findings into coherent patterns which reveal the advancing frontiers of science: these are the functions which only scientists can perform. It is terribly important that they be performed; the quality of future science, and the successful application of science for the benefit of society depend on them.

I should like to end on a note of optimism. I found it gratifying, as Convener of UNISIST, that scientists from different fields, that engineers and information scientists from different countries could work together so harmoniously. I was struck by the communality of awareness of the characteristics of the information problem and of our approach to it, despite the fact that we represented various national interests, and even differing economic systems.

I am optimistic for the future, not because we, as an international committee, were able to discuss and resolve these issues successfully, and I hope productively, but because of more fundamental reasons. I have stated elsewhere that the economic tides are running in favour of co-operation. No one country can afford to go it alone. The task of organizing and retrieving the totality of the world's science information is one which must be done, and one which must be shared as the only feasible approach.

We have seen how the very large and highly-sophisticated systems in chemistry, physics, biology, medicine, and the space sciences are being internationalized by the industrialized countries which have created them. This is a trend which augurs well for the future. As we develop other systems in fields such as agriculture or transportation, they are certain to follow the same path. I look forward to the opportunity of testing the utilization of these systems, heretofore of benefit almost exclusively to the industrialized countries, by the developing countries, as foreseen by one of our recommendations. I look forward also to the co-operative international development of systems under the sponsorship of the United Nations which will be devoted to those types of technical information which are directly applicable to the problems of economic development which many of the countries assembled here are facing.

I close in addressing a challenge to this audience as statesmen of science. Scientists and information scientists have collaborated successfully in preparing these recommendations for a programme of increased co-operation among nations to the end that science may grow and produce further benefits for the countries of the world. The fruits of this effort are yours to realize. Speaking for the UNISIST Committee, we believe it desirable to have an organizational focus perhaps within Unesco to provide for coherence of the information networks we have in mind. But we believe it even more important that each individual country represented here consider carefully its own policy, and dedicate itself to promoting in its own interest the interchange of information, of data, and of accumulated knowledge among the scientists of the world. The opportunities for constructive action which this meeting presents to all nations are enormous. It is my sincere hope that we will take advantage of them.

APPENDIX/APPENDICE/APENDICE/ДОПОЛНЕНИЕ C

LIST OF PARTICIPANTS/LISTE DES PARTICIPANTS
LISTA DE PARTICIPANTES/ СПИСОК УЧАСТНИКОВ

Names and titles in the following lists are reproduced as handed in to the Secretariat by the delegations concerned. Countries are shown in the French alphabetical order.

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Cientlficas

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National Library of Medicine
National Institute of Health
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Mr. Melvin S. Day
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Mr. Pierre R. Graham
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Mr. Robert A. Harte
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Mr. C.G. Giles
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Sir Harold Thompson
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Mr. Youri Kotchoubef
Permanent Delegate to Unesco

UNION DES REPUBLIQUES SOCIALISTES SOVIETIQUES/UNION OF SOVIET SOCIALIST REPUBLICS/UNION DE REPUBLICAS SOCIALISTAS SOVIETICAS/СОЮЗ СОВЕТСКИХ СОЦИАЛИСТИЧЕСКИХ РЕСПУБЛИК

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Dr. Alejandro Suels Aranda
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Mme le Dr Ines Veslej-Tanaskovic
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Membre du Comité pour la documentation de la
Commissior nationale pour l'Unesco

M. Ljubomir Dulovic
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II. NON-MEMBER STATES/ETATS NON MEMBRES ESTADOS NO MIEMBROS/ ГОСУДАРСТВА, НЕ ЯВЛЯЮЩИЕСЯ ЧЛЕНАМИ ЮНЕСКО

SAINT-SIEGE/HOLY SEE/SANTA SEDE/ВАТИКАН

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coordination auprès de l'Unesco

R.P. Philippe Roqueplo, O.P.
Professeur de philosophie des sciences
à l'Institut catholique de Paris

III. ORGANIZATIONS OF THE UNITED NATIONS SYSTEM ORGANISATIONS DU SYSTEME DES NATIONS UNIES ORGANIZACIONES DEL SISTEMA DE LAS NACIONES UNIDAS ОРГАНИЗАЦИИ СИСТЕМЫ ООН

NATIONS UNIES/UNITED NATIONS/NACIONES UNIDAS/ОРГАНИЗАЦИЯ ОБЪЕДИНЕННЫХ НАЦИЙ

Professor Pierre Auger
Member of the United Nations Advisory Committee
on Application of Science and Technology to
Development

Dr. Hans Einhaus
Chief, Geneva Branch
Office for Science and Technology

COMMISSION ECONOMIQUE POUR L'EUROPE/ ECONOMIC COMMISSION FOR EUROPE/COMISION ECONOMICA PARA EUROPA/ЭКОНОМИЧЕСКАЯ КОМИССИЯ ДЛЯ ЕВРОПЫ

Mr. K. Yrjo-Koskinen
Director
Trade and Technology Division

ORGANISATION DES NATIONS UNIES POUR LE DEVELOPPEMENT INDUSTRIEL/UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION/ ORGANIZACION DE LAS NACIONES UNIDAS PARA EL DESARROLLO INDUSTRIAL/ОРГАНИЗАЦИЯ ОБЪЕДИНЕННЫХ НАЦИЙ ПО ПРОМЫШЛЕННОМУ РАЗВИТИЮ

Mrs. V. Vince
Industrial Information Officer

PROGRAMME DES NATIONS UNIES POUR LE DEVELOPPEMENT/UNITED NATIONS DEVELOPMENT PROGRAMME/PROGRAMA DE LAS NACIONES UNIDAS PARA EL DESARROLLO/ ПРОГРАММА РАЗВИТИЯ ООН

Mr. Erling Dessau
Deputy Director
Management Information Service

ORGANISATION INTERNATIONALE DU TRAVAIL/ INTERNATIONAL LABOUR ORGANISATION/ ORGANIZACION INTERNACIONAL DEL TRABAJO/ МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ТРУДА

Mrs. L. Espinasse
ILO Branch Office in Paris

ORGANISATION DES NATIONS UNIES POUR L'ALIMENTATION ET L'AGRICULTURE/FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS/ORGANIZACION DE LAS NACIONES UNIDAS PARA LA AGRICULTURA Y LA ALIMENTACION/ПРОДОВОЛЬСТВЕННАЯ И СЕЛЬСКОХОЗЯЙСТВЕННАЯ ОРГАНИЗАЦИЯ ООН

M. R. Aubrac
Directeur de la Division de la documentation et de la bibliothèque

M. G. Dubois
Chef du Centre de documentation

Mr. K. Harada
Library
Division of Library and Documentation

ORGANISATION MONDIALE DE LA SANTE/WORLD HEALTH ORGANIZATION/ORGANIZACION MUNDIAL DE LA SALUD/ ВСЕМИРНАЯ ОРГАНИЗАЦИЯ ЗДРАВООХРАНЕНИЯ

Mr. R. Weitzel
Librarian
Library and Documentation

AGENCE INTERNATIONALE DE L'ENERGIE ATOMIQUE/INTERNATIONAL ATOMIC ENERGY AGENCY/ORGANISMO INTERNACIONAL DE ENERGIA ATOMICA/ МЕЖДУНАРОДНОЕ АГЕНТСТВО ПО АТОМНОЙ ЭНЕРГИИ

Mr. Charles Pelzer
Director of the Division of Scientific and Technical Information

Mr. Charles Gottschalk
Division of Scientific and Technical Information

BANQUE INTERNATIONALE POUR LA RECONSTRUCTION ET LE DEVELOPPEMENT/INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT/BANCO INTERNACIONAL DE RECONSTRUCCION Y FOMENTO/МЕЖДУНАРОДНЫЙ БАНК РЕКОНСТРУКЦИИ И РАЗВИТИЯ

Mr. Mervin Muller
Director
Computing Activities Department

UNION INTERNATIONALE DES TELECOMMUNICATIONS/INTERNATIONAL TELECOMMUNICATION UNION/UNION INTERNACIONAL DE TELECOMUNICACIONES/ МЕЖДУНАРОДНЫЙ СОЮЗ ЭЛЕКТРОСВЯЗИ

Mr. R. Smith
Engineer

Mr. A. El-Zanati
Librarian

IV. ORGANISATIONS INTERGOUVERNEMENTALES/INTERGOVERNMENTAL ORGANIZATIONS ORGANIZACIONES INTERGUBERNAMENTALES/МЕЖПРАВИТЕЛЬСТВЕННЫЕ ОРГАНИЗАЦИИ

BUREAU D'EDUCATION IBERO-AMERICAIN/ IBERO-AMERICAN OFFICE OF EDUCATION/ OFICINA DE EDUCACION IBEROAMERICANA/ ИБЕРО-АМЕРИКАНСКОЕ БЮРО ПРОСВЕЩЕНИЯ

Mr. C.V. Penna
Consultor, Secretaría General para Bibliotecas y Servicios de Información Cientffica y Técnica

BUREAU INTERNATIONAL DES POIDS ET MESURES/INTERNATIONAL BUREAU OF WEIGHTS AND MEASURES/OFICINA INTERNACIONAL DE PESAS Y MEDIDAS/ МЕЖДУНАРОДНОЕ БЮРО МЕР И ВЕСОВ

M. Pierre Carré
Physicien chercheur principal

CENTRE INTERNATIONAL DE CALCUL/INTERNATIONAL COMPUTATION CENTRE/CENTRO INTERNACIONAL DE CALCULO/ МЕЖДУНАРОДНЫЙ ВЫЧИСЛИТЕЛЬНЫЙ ЦЕНТР

Professeur Fermin Bernasconi

CENTRE LATINO-AMERICAIN DE PHYSIQUE/ LATIN-AMERICAN CENTRE FOR PHYSICS/ CENTRO LATINO-AMERICANO DE FISICA/ ЛАТИНОАМЕРИКАНСКИЙ ФИЗИЧЕСКИЙ ЦЕНТР

M. R. Bastos da Costa
Director

COMMISSION DES COMMUNAUTES EUROPEENNES/
COMMISSION OF EUROPEAN COMMUNITIES/
COMISION DE COMUNIDADES EUROPEAS/
КОМИССИЯ ЕВРОПЕЙСКИХ СООБЩЕСТВ

M. R. Brée
Directeur général de la
diffusion des connaissances

M. A. Mauperon
Chef de Division
Direction générale de la diffusion
des connaissances

M. G. Drees
Direction générale des affaires
industrielles, technologiques et
scientifiques

M. L. Bost
Direction générale des relations extérieures

M. S. Perschke
Chercheur
Centre de recherche d'Ispra

CONSEIL D'ASSISTANCE ECONOMIQUE
MUTUELLE/COUNCIL FOR MUTUAL ECONOMIC
ASSISTANCE/CONSEJO DE ASISTENCIA ECONO-
MICA MUTUA/СОВЕТ ЭКОНОМИЧЕСКОЙ
ВЗАИМОПОМОЩИ

Dr Y. Sorokin
Directeur du Centre international d'information
scientifique et technique

LIGUE DES ETATS ARABES/LEAGUE OF ARAB
STATES/LIGA DE LOS ESTADOS ARABES/
ЛИГА АРАБСКИХ ГОСУДАРСТВ

M. R. Chaffey
Délégué permanent de la Ligue des Etats arabes
auprès de l'Unesco

ORGANISATION DE COOPERATION ET DE
DEVELOPPEMENT ECONOMIQUE/ORGANIZA-
TION FOR ECONOMIC CO-OPERATION AND
DEVELOPMENT/ORGANIZACION DE COOPERA-
CION Y DE DESARROLLO ECONOMICOS/
ОРГАНИЗАЦИЯ ЭКОНОМИЧЕСКОГО
СОТРУДНИЧЕСТВА И РАЗВИТИЯ

Mr. P. Judge
Head
Scientific and Technical Information Section

Mr. A.A. Winters
Chairman
Information Policy Group

ORGANISATION DES ETATS AMERICAINS/
ORGANIZATION OF AMERICAN STATES/
ORGANIZACION DE LOS ESTADOS AMERICANOS/
ОРГАНИЗАЦИЯ АМЕРИКАНСКИХ ГОСУДАРСТВ

M. P. Gonod
Programme de transfert technologique
Département des affaires scientifiques et
technologiques

Mrs. M. Shepard
Chief Library Development Programme

ORGANISATION EUROPEENNE DE RECHERCHES
SPATIALES/EUROPEAN SPACE RESEARCH
ORGANIZATION/ORGANIZACION EUROPEA DE
INVESTIGACION DEL ESPACIO/ ЕВРОПЕЙСКАЯ
ОРГАНИЗАЦИЯ КОСМИЧЕСКИХ ИССЛЕДОВАНИЙ

M. J.R.U. Page
Directeur adjoint chargé de la Division de
l'enseignement et de l'information scientifique

M. D. Raitt
Section des opération techniques
Division de l'enseignement et de l'information
scientifique

ORGANISATION EUROPEENNE POUR LA RE-
CHERCHE NUCLEAIRE/EUROPEAN ORGANIZA-
TION FOR NUCLEAR RESEARCH/ORGANIZACION
EUROPEA DE INVESTIGACION NUCLEAR/
ЕВРОПЕЙСКАЯ ОРГАНИЗАЦИЯ ЯДЕРНЫХ
ИССЛЕДОВАНИЙ

M. A. Gunther
Chef de la Bibliothèque
et du Service de l'information scientifique

ORGANISATION MONDIALE DE LA PROPRIETE
INTELLECTUELLE/WORLD INTELLECTUAL
PROPERTY ORGANIZATION/ORGANIZACION
MUNDIAL DE LA PROPRIEDAD INTELECTUAL
ВСЕМИРНАЯ ОРГАНИЗАЦИЯ ИНТЕЛЛЕКТУАЛЬНОЙ
СОБСТВЕННОСТИ

Mr. P. Claus
Head of ICIREPAT Section
Industrial Property Division

Mr. L.F.V. Knight
Counsellor in Information Retrieval
International Patent Institute (IIB) - The Hague

V. ORGANISATIONS INTERNATIONALES NON GOUVERNEMENTALES EN RELATION DE CONSULTATION AVEC L'UNESCO (CATEGORIES A, B)/INTERNATIONAL NON-GOVERNMENTAL ORGANIZATIONS IN CONSULTATIVE RELATIONSHIP WITH UNESCO (CATEGORIES A, B)/ ORGANIZACIONES INTERNACIONALES NO GUBERNAMENTALES QUE MANTIENEN RELACIONES DE CONSULTA CON LA UNESCO (CATEGORIAS A Y B)/МЕЖДУНАРОДНЫЕ НЕПРАВИТЕЛЬСТВЕННЫЕ ОРГАНИЗАЦИИ, ИМЕЮЩИЕ КОНСУЛЬТАТИВНЫЙ СТАТУС ПРИ ЮНЕСКО (КАТЕГОРИИ А и В)

ASSOCIATION INTERNATIONALE DES UNIVERSITES/INTERNATIONAL ASSOCIATION OF UNIVERSITIES/ASOCIACION INTERNACIONAL DE UNIVERSIDADES/МЕЖДУНАРОДНАЯ АССОЦИАЦИЯ УНИВЕРСИТЕТОВ

Mr. H.M.R. Keyes

ASSOCIATION INTERNATIONALE D'INFORMATION SCOLAIRE, UNIVERSITAIRE ET PROFESSIONNELLE/INTERNATIONAL ASSOCIATION FOR EDUCATIONAL AND VOCATIONAL INFORMATION/ASOCIACION INTERNACIONAL DE INFORMACION ESCOLAR, UNIVERSITARIA Y PROFESIONAL/МЕЖДУНАРОДНАЯ АССОЦИАЦИЯ ШКОЛЬНОЙ, УНИВЕРСИТЕТСКОЙ И ПРОФЕССИОНАЛЬНОЙ ИНФОРМАЦИИ
M. P. Dasté

M. L. Todorov

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Dr. B. Riegel

Mrs. J. Poyen

Dr. D.B. Baker

Mr. J.R. Smith

Prof. A.J.C. Wilson

COMITE D'ETUDES DES DONNEES DE LA SCIENCE ET DE LA TECHNOLOGIE/COMMITTEE ON DATA FOR SCIENCE AND TECHNOLOGY/ COMITE DE ESTUDIO DE DATOS CIENTIFICOS Y TECNOLOGICOS/КОМИТЕТ ДАННЫХ ПО НАУКЕ И ТЕХНИКЕ

Prof. B. Vodar

Dr. Ch. Schäfer

Dr. L.M. Branscomb

COMITE INTERNATIONAL POUR LA DOCUMENTATION DES SCIENCES SOCIALES/INTERNATIONAL COMMITTEE FOR SOCIAL SCIENCES DOCUMENTATION/COMITE INTERNACIONAL DE DOCUMENTACION SOBRE CIENCIAS SOCIALES/МЕЖДУНАРОДНЫЙ КОМИТЕТ СОЦИОЛОГИЧЕСКОЙ ДОКУМЕНТАЦИИ

M. J. Meyriat

CONFERENCE MONDIALE DE L'ENERGIE/ WORLD ENERGY CONFERENCE/CONFERENCIA MUNDIAL DE LA ENERGIA/ ВСЕМИРНАЯ КОНФЕРЕНЦИЯ ПО ЭНЕРГЕТИКЕ

M. G. Combet

Mme A. David

CONSEIL DES ORGANISATIONS INTERNATIONALES DES SCIENCES MEDICALES/ COUNCIL FOR INTERNATIONAL ORGANIZATIONS OF MEDICAL SCIENCES/CONSEJO DE ORGANIZACIONES INTERNACIONALES DE LAS CIENCIAS MEDICAS/СОВЕТ МЕЖДУНАРОДНЫХ ОРГАНИЗАЦИЙ ПО МЕДИЦИНСКИМ НАУКАМ

Dr. S. Btesh

CONSEIL INTERNATIONAL DE LA PHILOSOPHIE ET DES SCIENCES HUMAINES/INTERNATIONAL COUNCIL FOR PHILOSOPHY AND HUMANISTIC STUDIES/CONSEJO INTERNACIONAL DE FILOSOFIA Y CIENCIAS HUMANAS/ МЕЖДУНАРОДНЫЙ СОВЕТ ПО ФИЛОСОФИИ И ГУМАНИТАРНЫМ НАУКАМ

Mr. F.W.G. Baker

CONSEIL INTERNATIONAL DES SCIENCES SOCIALES/INTERNATIONAL SOCIAL SCIENCE COUNCIL/CONSEJO INTERNACIONAL DE CIENCIAS SOCIALES/МЕЖДУНАРОДНЫЙ СОВЕТ ПО СОЦИАЛЬНЫМ НАУКАМ
Mr. S. Friedman

CONSEIL INTERNATIONAL DES UNIONS SCIENTIFIQUES/INTERNATIONAL COUNCIL OF SCIENTIFIC UNIONS/CONSEJO INTERNACIONAL DE UNIONES CIENTIFICAS/МЕЖДУНАРОДНЫЙ СОВЕТ НАУЧНЫХ СОЮЗОВ

Prof. V.A. Ambartsumian

Dr. P.L. Altmann

Mr. F.W.G. Baker

Prof. E. Becker

Prof. K. Clayton

Prof. J.E. Dubois

Prof. K. Faegri

Prof. P. Fleury

Dr. S. van der Heide

Prof. S.A. Lauter

Dr. F.W. Matthews

Dr. C.M. Minnis

Dr. P. Parkins

Prof. F.A. Stafleu

Dr. J.B. Sykes

Dr. B. Winde

FEDERATION EUROPEENNE D'ASSOCIATIONS NATIONALES D'INGENIEURS/EUROPEAN FEDERATION OF NATIONAL ASSOCIATIONS OF ENGINEERS/FEDERACION EUROPEA DE ASOCIACIONES NACIONALES DE INGENIEROS/ ЕВРОПЕЙСКАЯ ФЕДЕРАЦИЯ НАЦИОНАЛЬНЫХ АССОЦИАЦИЙ ИНЖЕНЕРОВ

Prof. V. Broída

M. G. Clogenson

FEDERATION INTERNATIONALE DE DOCUMENTATION/INTERNATIONAL FEDERATION FOR DOCUMENTATION/FEDERACION INTERNACIONAL DE DOCUMENTACION/МЕЖДУНАРОДНАЯ ФЕДЕРАЦИЯ НАУЧНО-ТЕХНИЧЕСКОЙ ДОКУМЕНТАЦИИ

Mr. R.E. McBurney

Prof. Dr. H. Arntz

Dr. F.A. Sviridov

FEDERATION INTERNATIONALE DES ASSOCIATIONS DE BIBLIOTHECAIRES/INTERNATIONAL FEDERATION OF LIBRARY ASSOCIATIONS/ FEDERACION INTERNACIONAL DE ASOCIACIONES DE BIBLIOTECARIOS/МЕЖДУНАРОДНАЯ ФЕДЕРАЦИЯ БИБЛИОТЕЧНЫХ АССОЦИАЦИЙ

Dr. A.J. Evans

Dr. W. Lingenberg

FEDERATION MONDIALE DES ORGANISATIONS D'INGENIEURS/WORLD FEDERATION OF ENGINEER ORGANIZATIONS/FEDERACION MUNDIAL DE ORGANIZACIONES DE INGENIEROS/ ВСЕМИРНАЯ ФЕДЕРАЦИЯ ОРГАНИЗАЦИЙ ИНЖЕНЕРОВ

Dr. F.G. Gainsborough

Dr. D.H. Barlow

Miss M.E. Woulfe

ORGANISATION INTERNATIONALE DE NORMALISATION/INTERNATIONAL ORGANIZATION FOR STANDARDIZATION/ORGANIZACION INTERNACIONAL DE UNIFICACION DE NORMAS/ МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ

Mr. B.E. Kuiper

Dr. E. Wüster

Mrs. N. Dusoulier

Mrs. J. Eggert

Dr. W. Lingenberg

Dr. J. Orne

Mr. H. Felber

UNION DES ASSOCIATIONS TECHNIQUES INTERNATIONALES/UNION OF INTERNATIONAL ENGINEERING ORGANIZATIONS/UNION DE ASOCIACIONES TECNICAS INTERNACIONALES/ СОЮЗ МЕЖДУНАРОДНЫХ ИНЖЕНЕРНО-ТЕХНИЧЕСКИХ ОРГАНИЗАЦИЙ

M. C. Dedeystere

UNION INTERNATIONALE DES EDITEURS/INTERNATIONAL PUBLISHERS' ASSOCIATION/ UNION INTERNACIONAL DE EDITORES/ МЕЖДУНАРОДНАЯ АССОЦИАЦИЯ ИЗДАТЕЛЕЙ

M. E. Proskauer

VI. ORGANISATIONS INTERNATIONALES NON GOUVERNEMENTALES EN RELATION D'INFORMATION MUTUELLE AVEC L'UNESCO (CATEGORIE C)/ INTERNATIONAL NON-GOVERNMENTAL ORGANIZATIONS IN MUTUAL INFORMATION RELATIONSHIP WITH UNESCO (CATEGORY C)/ORGANIZACIONES INTERNACIONALES NO GUBERNAMENTALES QUE MANTIENEN RELACIONES DE INFORMACION MUTUA CON LA UNESCO (CATEGORIA C)/МЕЖДУНАРОДНЫЕ НЕПРАВИТЕЛЬСТВЕННЫЕ ОРГАНИЗАЦИИ, ПОДДЕРЖИВАЮЩИЕ С ЮНЕСКО ОТНОШЕНИЯ ВЗАИМНОЙ ИНФОРМАЦИИ (КАТЕГОРИЯ C)

SOCIETE INTERNATIONALE POUR LE DROIT D'AUTEUR/INTERNATIONAL COPYRIGHT SOCIETY/SOCIEDAD INTERNACIONAL DE DERECHOS DE AUTOR/МЕЖДУНАРОДНОЕ ОБЩЕСТВО АВТОРСКОГО ПРАВА

Mr. R. Talon

APPENDIX/APPENDICE D

LIST OF OFFICERS OF THE CONFERENCE/
LISTE DES MEMBRES DES BUREAUX DE LA CONFERENCE

President/Président

Dr. Harrison S. Brown
Foreign Secretary
National Academy of Sciences
(Etats-Unis d'Amérique/United States of America)

Vice-Presidents/Vice-présidents (8)

M. H. Liebaers
Président du Comité de coordination
du Programme national de l'informatique
et conservateur en chef de la Bibliothèque royale
(Belgique/Belgium)

Général Arthur Mascarenhas Façanha
Président du Conseil national de recherches
(Brésil/Brazil)

Dr. Ahmad Abd-El Hamid Kabesh
Director-General
National Information and Documentation Centre
The Academy of Scientific Research and Technology
(République arabe d'Egypte/Arab Republic of Egypt)

S. Exc. M. le professeur F. Reza
Ambassadeur
Délégué permanent auprès de l'Unesco
(Iran/Iran)

Dr. Kanekuro Kaneshige
Member of the Council for Science and Technology
Member of the Japanese National Commission for Unesco
(Japon/Japan)

Mrs. B.A.M. Okusanya
Nigerian Council for Science and Technology
Secretariat
(Nigeria/Nigeria)

H.E. Dr. Antonín Mrázek
Deputy Minister
Ministry of Technical Development and Investment
Federal Government of the Czechoslovak Socialist Republic
(Tchécoslovaquie/Czechoslovakia)

M. J.M. Gvishiani
Vice-président du Comité d'Etat pour la science et la technique
(Union des républiques socialistes soviétiques/
Union of Soviet Socialist Republics)

Rapporteur General/Rapporteur général

Mr. H.T. Hookway
Under Secretary
Department of Education and Science
(Royaume Uni/United Kingdom)

Deputy Rapporteur General/Rapporteur général adjoint

Mr. N.B. Arutyunov
Chef du Département de l'information scientifique du Comité d'Etat pour la science et la technique
(Union des républiques socialistes soviétiques/
Union of Soviet Socialist Republics)

Drafting Committee/Comité de Rédaction

Dr. Martin Cremer
Director
Institute for Documentation, Frankfurt
(République fédérale d'Allemagne/Federal Republic of Germany)

Dr. Ricardo Gietz
Chief of Department,
Centre of Scientific Documentation,
Consejo Nacional de Investigaciones Científicas y Técnicas
(Argentine/Argentina)

Dr J.E. Brown
Administrateur de la Bibliothèque scientifique nationale
(Canada/Canada)

Mr. Robert A. Harte
Executive Officer
American Society of Biological Chemists
(Etats Unis d'Amérique/United States of America)

M. J. d'Olier
Directeur adjoint du Centre de documentation pour les sciences exactes du CNRS
(France/France)

Mr. János Duzs
Chief of Department of the National Commission for Technical Development
Permanent Representative of the International Centre for Scientific and Technical Information
(Hongrie/Hungary)

Miss W. Partaningrat
Director of the National Scientific and Technical Documentation Centre
Indonesian Institute of Sciences
(Indonésie/Indonesia)

S. Exc. M. Valentin Lipatti
Ambassadeur
Délégué permanent auprès de l'Unesco
(Roumanie/Romania)

Chairman/Président

Mr. H.T. Hookway
Under Secretary
Department of Education and Science
(Royaume Uni/United Kingdom)

Mr. B. Tell
Chief Librarian
Royal Institute of Technology
(Suède/Sweden)

Mr. N.B. Arutyunov
Chef du Département de l'information scientifique et technique du Comité d'Etat pour la science et la technique
(Union des républiques socialistes soviétiques/Union of Soviet Socialist Republics)

Dr V. Rybatchenkov
Sous-directeur de Laboratoire du Centre d'Etat de l'information scientifique et technique
(Union des républiques socialistes soviétiques/Union of Soviet Socialist Republics)

Dr. Marcel Roche
Presidente del Consejo Venezolano de Investigaciones Cientfficas y technologicas
(Venezuela/Venezuela)

APPENDIX/APPENDICE B

ADDENDUM

SECRETARIAT OF THE CONFERENCE/
SECRETARIAT DE LA CONFERENCE

Director-General/Directeur général

Mr. René Maheu

Assistant Director-General for Science/Sous-Directeur général pour les sciences

Mr. A. Buzzati-Traverso

Director, Department of Science Policy and Promotion of Basic Sciences/Directeur du Département de la politique scientifique et de la promotion des sciences fondamentales

Mr. I. Malecki

Secretary of the Conference/Secrétaire de la Conférence

Mr. A. Wysocki

Assistant Secretary of the Conférence/Secrétaire adjoint de la Conférence

Mr. J. Tocatlian
assisted by/Assistants : Mr. W. Löhner
Miss J. Taylor

Experts

Mr. S. Adams
Mr. B. Adkinson
Mr. H. Coblans
Mr. J.C. Gardin
Mr. M. Harris

Secretarial Assistants/Personnel de secrétariat

Miss C. Gladieux
Mrs. P. Göbel
Mrs. M. Lassen
Miss V. Maggio

Appendix #1

REPORT

of the

UNITED STATES DELEGATION

to the

Intergovernmental Conference for the Establishment of a World Science Information System (UNISIST)

Paris, France

October 4-8, 1971

Submitted to the SECRETARY OF STATE

W. D. McElroy
Chairman of the Delegation

January 21, 1972

Prepared by: Andrew A. Aines

REPORT

of the

UNITED STATES DELEGATION

to the

Intergovernmental Conference for the Establishment
of a World Science Information System (UNISIST)

Paris, France

October 4-8, 1971

1. The Intergovernmental Conference for the Establishment of a World Science Information System (UNISIST) was convened by the United Nations Educational, Scientific, and Cultural Organization (Unesco) at Unesco House, Paris, 4-8 October, 1971. The Conference met in plenary sessions, completing its work in an evening session on 8 October, 1971, instead of on 9 October, 1971, as previously announced.

2. Background. The Conference was convened for the purpose of reviewing the recommendations for improving international scientific communication made by the joint study committee of the International Council for Scientific Unions (ICSU) and the United Nations Educational, Scientific, and Cultural Organization (Unesco). The results of this joint study of the feasibility of a world science information system (UNISIST), undertaken between January 1967 and May 1970, had been previously published by Unesco in two versions, the shorter one serving as the working paper of the Conference. The Conference was requested to advise the Director General of Unesco on the desirability of establishing a new program (also to be known as UNISIST) for the purpose of increasing voluntary cooperation in the international exchange of scientific and technical information. The key issues to be reviewed by the Conference were: 1) the principles underlying such a program, 2) the broad program objectives, and 3) the provisions for organization and management.

3. Agenda. The agenda of the Conference was adopted without change (Appendix 1, page 19).

4. Participation. The Conference was attended by delegates representing 83 member and affiliated states of Unesco. The delegations of 16 of these countries were headed by individuals of ministerial rank. In addition, a total of 39 intergovernmental and nongovernmental organizations was represented by one or more observers. The largest group of

observers was organized by the International Council of Scientific Unions (ICSU), the co-sponsor of the study. The ICSU delegation included two observers from the German Democratic Republic, which is a national member of the Council. A complete listing of the national delegations, the representatives of intergovernmental organizations enjoying reciprocity relations with Unesco, and the representatives of nongovernmental organizations is attached (Appendix 1, page 41).

5. United States Delegation. The following were accredited to the United States Delegation:

William D. McElroy, Chairman
Director, National Science Foundation

Andrew A. Aines
Senior Staff Associate
Office of Science Information Service
National Science Foundation

Lewis M. Branscomb
Director, National Bureau of Standards

Harrison Brown
Foreign Secretary
National Academy of Sciences

Martin M. Cummings
Director
National Library of Medicine

Melvin S. Day
Head, Office of Science Information Service
National Science Foundation

Robert A. Harte
Executive Officer
American Society of Biological Chemists

Pierre R. Graham
U.S. Permanent Representative to Unesco
Paris

Arnold Kramish
Science Liaison Attache
U.S. Permanent Representative to Unesco
Paris

Dr. McElroy led the Delegation until Thursday morning, October 7, when a prior engagement necessitated his assigning the leadership of the Delegation to Dr. Branscomb.

While the Conference was not open to the public, twelve American citizens attended as representatives of intergovernmental organizations and observers of nongovernmental organizations invited to participate. These included:

Burton W. Adkinson Director American Geographical Society	Observer, UNISIST Central Committee
Philip Altmann Director Office of Biological Handbooks Federation of American Society for Experimental Biology	Observer, ICSU
Dale Baker Director Chemical Abstracts Service	Observer, ICSU/AB
Lewis M. Branscomb Director National Bureau of Standards	Observer, ICSU CODATA
Milton Harris Chairman, Board of American Chemical Society	Observer, UNISIST Central Committee
Jerrold Orne University Librarian The University of North Carolina Library	Observer, ISO
Phyllis Parkins Director Biological Abstracts BioScience Information Service	Observer, ICSU
Eric Proskauer Senior Vice-President John Wiley & Sons, Inc.	Observer, Scientific, Technical and Medical Publishers Group of the International Publishers Association
Byron Riegel Past Chairman of the Board of American Chemical Society	Observer, ICSU/AB

Charles Gottschalk Division of Scientific and Technical Information International Atomic Energy Agency	Representative, International Atomic Energy Agency
Mervin E. Muller Director, Department of Computing Activities International Bank for Reconstruction and Development	Representative, International Bank for Reconstruction and Development
Charles W. Pelzer Director, Division of Scientific and Technical Information International Atomic Energy Agency	Representative, International Atomic Energy Agency
Marietta Daniels Shepard Chief, Library Development Program Organization of American States	Representative, Organization of American States

Preparation of the U.S. Delegation. Considerable advance work went into the preparation of professional, technical, and political briefings for the U.S. Delegation. This help was provided by the COSATI Panel on International Information Activities, members of the National Academy of Sciences, professional societies, and other groups of the governmental, academic, and industrial sectors. This resulted in draft positions on the 22 program recommendations of the UNISIST published report, together with a draft resolution on the organization and management of a UNISIST program. These preliminary positions were reviewed at a second meeting of the COSATI International Panel on June 23, 1971. Dr. David Z. Beckler, Office of Science and Technology, contributed to the preparations at a further meeting to review the overall position and strategy to be adopted by the Delegation. The following offices of the Department of State also contributed to the development of U.S. positions: Office of Multilateral Policy and Programs (CU/MPP), Office of International Conferences (IO/OIC), Bureau of International Scientific and Technological Affairs (SCI), Agency for International Development (AID).

A first formal briefing of the Delegation was held in the Office of the Chairman on August 16, 1971. A second briefing, held on September 16, 1971, included representatives of the Office of Telecommunications Policy and the Information Industry Association. A third briefing concentrating on the political aspects in which Mr. Pierre R. Graham, the U.S. Permanent Representative to Unesco, and Dr. Arnold Kramish, the Science Liaison Attache of the U.S. Permanent Representative to Unesco, participated was

held on October 3, 1971, in Paris. U.S. participants in the Conference other than the Delegation were invited to attend this briefing as observers.

6. Organization of the Conference. The UNISIST Conference was convened at 10:30 a.m., October 4, 1971. Following introductory addresses by the Honorable Rene Maheu and Academician V. A. Ambartsumian, President of the International Council of Scientific Unions, the Conference elected Professor Harrison Brown of the U.S. Delegation as its President on the nomination of Poland, seconded by Japan.

Following interventions by Romania, Cuba, Viet Nam, Bulgaria, Hungary, and the USSR, relating to the absence of the People's Republic of China, the German Democratic Republic, the People's Republic of Korea and other political matters, the remaining officers of the Conference were elected. On the recommendation of groups of the developing countries that wide representation would be desirable on the Steering Committee through the election of multiple Vice-Presidents, the following Vice-Presidents were elected: Gvishiani (USSR), nominated by Canada; Kaneshige (Japan), nominated by Australia; Kabesh (Arab Republic of Egypt), nominated by Hungary; Okusanya (Nigeria), nominated by the United Kingdom; Facanha (Brazil), nominated by Norway; Mrazek (Czechoslovakia), nominated by Finland; Reza (Iran), nominated by Honduras; Liebaers (Belgium), nominated by Netherlands. Hookway (United Kingdom) was nominated by Sweden for the post of Rapporteur General, and Arutiunov (USSR) was nominated by the United States to the post of Deputy Rapporteur General.

On the recommendation of the Steering Committee, the Conference appointed a Drafting Committee to assist the Rapporteur General and the Deputy Rapporteur General in the drafting of resolutions and the final report of the Conference. Members of the Drafting Committee were: Gietz (Argentina), Brown (Canada), D'Olier (France), Cremer (Federal Republic of Germany), Duza (Hungary), Partaningrat (Indonesia), Lipatti (Romania), Tell (Sweden), Rybachenkov (USSR), Harte (U.S.), Roche (Venezuela).

7. Work of the Committees. The Drafting Committee received 14 draft resolutions submitted by national delegations from which it developed a draft resolution (DR. 15) which, after two revisions, became the Conference resolution.

8. Work of the Conference. The Steering Committee proposed a procedure calling for the Drafting Committee to submit either three separate resolutions on UNISIST principles, UNISIST program objectives, and UNISIST organization and management, or one resolution that would encompass the three parts. It was agreed to follow the latter procedure, with any draft resolutions to be submitted by national delegations to be reflected either in the Conference draft resolution, or in the report of the Conference. Resolutions on the specific recommendations of the published UNISIST Report were discouraged.

The delegations of the U.S. and the USSR jointly sponsored a draft resolution (D.R. 5) together with the Ukrainian and Byelorussian Soviet Socialist Republic, Czechoslovakia, Poland, Hungary, Mongolia, Bulgaria, France, the Arab Republic of Egypt, Ireland, India, and the United Kingdom. The key elements in this joint draft resolution concerned the management of the UNISIST program, namely: (1) creation within Unesco of a permanent secretariat which would be responsible for the preparation and implementation of measures concerning the budget and programs; (2) establishment of an intergovernmental Steering Committee to advise on program priorities and development; and (3) establishment, in consultation with ICSU and other organizations, of an Advisory Committee of scientists, engineers and information specialists to assess periodically the ability of the UNISIST program to meet the needs of, and provide services to the world's communities of scientists and engineers. This draft resolution served as the base for the draft resolution (D.R. 15) which in its second revision was passed as the Conference resolution (Appendix 1, page 17). The adopted Resolution gave the Steering Committee supervisory, rather than advisory, authority over program priorities and development.

While the Drafting Committee was engaged in preparing the text of D.R. 15 for debate, the Conference discussed in plenary session the principles underlying the UNISIST program, its program objectives, and aspects of its proposed organization and management. The principal interventions of the U.S. Delegation were: 1) opening speech of Dr. W. D. McElroy, Chairman, on October 4 (Appendix 2); 2) Statement on UNISIST Priorities by Dr. McElroy, October 6 (Appendix 3); 3) Summary Remarks by Dr. Lewis M. Branscomb, Acting Chairman, U.S. Delegation, October 8 (Appendix 4). The U.S. Delegation in its formal remarks and informal interactions with other delegations strove to promulgate a clearer interpretation and understanding of the concept of UNISIST as a program, based on voluntary cooperation between existing and future autonomous national, regional and international scientific and technical information services and systems, and not as a single, monolithic system.

In the discussion of D.R. 15, the interest of the developing and the industrialized countries became polarized, with the developing countries insisting that Unesco assign priorities to the needs of developing countries, and that substantial long term assistance programs should be undertaken to help them in developing their manpower and infrastructure so that they might share information with the industrialized countries. The U.S. Delegation became concerned that the wording of the proposed draft resolution in two places were encouraging unrealistic expectations on the part of less developed countries and implied a significantly increased fiscal burden for the industrialized countries. At the final session of the Conference, the Director General of Unesco at the urging of the U.S. Delegation gave his personal interpretation of the phraseology used in the

draft resolution. In amplifying the Director General's comments, the Assistant Director General explained that financial means for UNISIST activities would have to be found within the Regular Budget of Unesco which is approved by the General Conference. With this assurance, the Acting Chairman of the U.S. Delegation, Dr. Branscomb, declared the Delegation's support for the draft resolution (see Appendix 4). This support was echoed by the USSR, and by Sudan which had taken a leading role in representing the interests of the developing countries.

Draft Resolution 15 was then voted: 69, including the U.S., for, 0 against, and 1 (Canada) abstention.

A writing team under the Rapporteur General had been producing on a seriatim basis the Conference report. This was discussed at an evening session of the Conference on October 8, and after minor editorial changes, which were accepted by the Conference at large, was approved: 66 for, 0 against, and 0 abstentions. The Final Report of the Conference, which includes the Conference Resolution, the Agenda, four major addresses and speeches delivered at the inaugural session, the list of participants, and the list of officers of the Conference and Secretariat, is appended (Appendix 1). A complete set of additional documentation of the UNISIST Conference is transmitted herewith as Appendix 5 to this report.

9. Future Meetings. While the Conference resolution requests the Director General of Unesco to "convene periodically an intergovernmental conference to approve a long-term plan for UNISIST, and to review and evaluate the progress of the UNISIST programme," approval for such a conference by the General Conference of Unesco is required. No date has been set, therefore, for a future conference.

10. Post-Conference Requirements. The U.S. Delegation wishes to draw the attention of the Department of State to several post-Conference requirements that the United States will be faced with in the interim between the UNISIST Conference and the convening of the Unesco General Conference in October 1972:

First, the program plans and budget for the UNISIST program will be developed by the UNISIST Secretariat for submission to the Unesco Executive Board, and subsequently to the General Conference of Unesco which meets in October 1972. It is highly important that U.S. representatives on the Unesco Executive Board and U.S. representation at the next General Conference of Unesco be adequately briefed on the technical and professional, as well as the political, aspects of UNISIST.

Second, to ensure protection of U.S. interests in the UNISIST program, consideration should be given now to the nature of adequate U.S. representation on the intergovernmental Steering Committee and the Advisory Committee that will be established when the October 1972 Unesco General Conference approves the UNISIST Conference Resolution.

Third, the United States should have a clearly stated position on those UNISIST projects to be developed in the interim (November 1971-October 1972) by Unesco which were identified as (1) an International Serials Data System, (2) training programs, and (3) assistance to developing countries.

List of Appendixes

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Appendix #2

SPEECH OF DR. W. D. McELROY, CHAIRMAN
DELEGATION OF THE UNITED STATES OF AMERICA
TO
THE INTERGOVERNMENTAL CONFERENCE FOR THE
ESTABLISHMENT OF A WORLD SCIENCE
INFORMATION SYSTEM (UNISIST)

UNESCO HOUSE, PARIS - OCTOBER 4, 1971

Mr. President, Distinguished Delegates, Ladies and Gentlemen:

I bring you greetings and wishes for a successful conference from the United States' community of scientists, engineers, communicators, information scientists, and librarians, and others in my country who share our common aspirations for a successful global, scientific and technical information program, and also from my fellow delegates who have joined me in this important meeting.

Before I make a few remarks expressing some of the points of view of this delegation, I wish to congratulate the conveners of the UNISIST Conference for focusing the world's attention on the important issues of scientific and technical communication. I should also like to express my appreciation to the dedicated individuals of the UNISIST Study Group, whose diligent work made this conference possible, and to the officials of the International Council of Scientific Unions and of Unesco for this extraordinary act of collaboration which has and will continue to be so fruitful. I would further like to extend my warmest thanks to the friendly and great people of the beautiful country of France for so graciously and hospitably providing us with such a perfect setting for this important event.

My Soviet colleague has been eloquent in articulating the promise that UNISIST holds. It is clear that scientists everywhere have the same outlook about the necessity for and the benefits to be derived from the sharing of scientific and technical knowledge.

In the United States there is an increased perception of the promise that powerful new communications and information-processing technologies may hold for the peoples of the world. At the same time we are aware of the technical difficulties involved in their use. Still, we see the achievement of the UNISIST concept as an important part of the effort to adjust and adapt to these new forces and opportunities. We hope that thoughtful men and women everywhere will dedicate themselves to the UNISIST ideals.

The American delegation endorses fully the principles of international cooperation on which the UNISIST proposals are based. It has long been the policy of my country to share its scientific and technical information with other countries and to promote the unimpeded flow and exchange of information. This is being done through many mechanisms and channels -- through assistance to scientists in publishing the results of their research and development; through the creation of governmental programs such as the National Technical Information Service to make the results of government research and development projects widely available; through the Smithsonian Science Information Exchange which maintains a register of current research project information; through the National Referral Center for Science and Technology which provides a catalog of American information sources; through comprehensive abstracting and indexing systems and through a responsive commercial information industry which provide a large variety of specialized services and products; and through thousands of information exchange arrangements in all fields of science with organizations in other countries. We strongly support the informal interchange of information by individual scientists with their colleagues in other countries, and we earnestly encourage its expansion as one of the most natural and effective means of scientific communication.

For the foreseeable future we will have to maintain conventional information-processing programs based on the printed word; however, as nations of the world mechanize their information processes to improve the efficiency and ability to handle information, we must ensure that there exists the necessary communications technology for the efficient exchange of information. We, therefore, see in the UNISIST program the establishment of an international mechanism that will help reduce the dangers of a communications technology gap.

I am sure that this problem has been of primary concern to the architects of UNISIST and to every country represented here today. Its solution, however, will take much hard work by many dedicated men and women as part of the UNISIST effort.

As a biochemist, I have witnessed over the years the difficulties entailed in improving the communications process in my own field, and I am aware of the economic, cultural, political, and financial obstacles that must be overcome. The challenge we face in developing an international scientific and technical information program within which to interconnect scientists, engineers, administrators, educators and the public alike is a task that may require many years. It cannot be done instantaneously. I believe the attainment of the UNISIST goal within individual countries will be a major accomplishment.

If we are to succeed in the UNISIST mission, we must not minimize the problems we face. For example, while mechanization of the information process will bring more speed and more ability to extract the information and data we need, it stands to reason that costs of this process will increase.

Scientific and technical information is costly to produce, costly to obtain, costly to disseminate, and at times costly to use. UNISIST offers the base by which these costs can be reduced through international cooperation, coordination, standards, and uniform practices -- a goal to be earnestly sought by all of us.

I wish to re-emphasize that in spite of all of the obstacles and difficulties to be overcome, the United States delegation fully endorses the UNISIST concept and principles. Our delegation is convinced that if we fail to create a rational international scientific and technical information plan the consequences will be very costly to all nations in the long run.

Finally, I would like to make a few brief comments about the special problems of developing countries.

First, it is my judgment that no country, including my own, has yet achieved a fully effective scientific and technical information system. We are all on the road to development. Some countries may be a little farther down the road than others, but hardly more than that.

Second, it does not help a country to be part of the international apparatus, able to draw from the world's knowledge bank rapidly, unless it has a growing infra-structure able to use and exploit knowledge in the country. An information program, not based on specific and known needs, will probably remain unused. I hope the delegates from all states will be mindful of the fact that having technical information does not automatically mean that technical development will occur.

Third, modern information systems require high level planning, coordination, and management. These are necessary national investments; there are no short cuts.

And fourth, we must all be prepared to help each other -- developed and developing countries. The climate for progress must envelop and stimulate all of us alike. My country is pleased to join all others to help developing countries through UNISIST and other mechanisms.

Appendix #3

REMARKS OF DR. W. D. McELROY, CHAIRMAN
DELEGATION OF THE UNITED STATES OF AMERICA
TO
THE INTERGOVERNMENTAL CONFERENCE FOR THE
ESTABLISHMENT OF A WORLD SCIENCE
INFORMATION SYSTEM (UNISIST)

UNESCO HOUSE, PARIS - OCTOBER 6, 1971

Mr. President, Ladies and Gentlemen:

My delegation, after hearing many thoughtful suggestions from other delegates, has concluded that there are priority programs and actions that should be undertaken if UNISIST is to be effectively launched. It is my hope that we can all come to agreement on the most important of these. This does not mean that several of the 22 recommendations are unimportant, but we do believe that some should receive attention before the others.

For example, the most important step to be undertaken is to take action on recommendation 22. Without a permanent secretariat, we will have no continuing effort and UNISIST will be stillborn. We also need a vigorous steering group and an advisory group from science and technology.

As our second priority, we urge implementation of recommendations 20 and 21 -- international assistance to developing countries. In my earlier remarks, we urged that we consider ourselves as a family of nations resolved to help one another. We must move toward that goal as rapidly as possible. It is my hope that other nations will join in a specific program that will be channeled through international organizations. Several pilot experiments should be created, oriented toward developing nations. The U.S. is prepared to help organize these pilot experiments.

Our third priority is for the designation of a national focal point or several coordinated focal points, if national organizations make this necessary. It is our experience that without a focal point, arrangements at the highest possible level, support and resources will be hard to obtain. Moreover, the need for an intellectual base which binds government, scientists, engineers, information specialists and users together makes the focal point a good investment for each country. There will be an added dividend in that such a focus in each government should contribute to the earlier application of electronic data processing and telecommunications.

Our fourth priority logically flows from the preceding. This is the need for manpower development. As we seek to raise the general level of training to an acceptable level and to bring early mechanization into the information process, it becomes evident that trained men and women are a condition for success in each country. The proposal of our Polish colleagues is attractive, we are already working with Poland in translation programs;

we would be willing to propose to our government that this be expanded to include some support for such an international center. We suggest that initially this be limited to the training or personnel from developing countries. Perhaps similar centers could be established in other parts of the world to ensure the rapid upgrading of expertise. We suggest that this be recommended to the Unesco group which will implement UNISIST.

As our fifty priority, our delegation proposes a rigorous examination of administrative barriers within and between countries. We must discourage any kind of an obstacle that inhibits the interchange of knowledge among nations, especially those that are not based on logic, but merely on earlier practices. Pricing policies must encourage, not discourage, the flow of knowledge.

Appendix # 4

COMMENTS BY DR. LEWIS M. BRANSCOMB
Director, National Bureau of Standards

U.S. DELEGATION TO THE CONFERENCE FOR THE ESTABLISHMENT OF A WORLD SCIENCE INFORMATION SYSTEM (UNISIST) AT 5:15 P.M., 8 OCTOBER 1971. THE U.S. DELEGATION REQUESTS THAT THESE COMMENTS BE INCLUDED IN THE RECORD.

The U.S. Delegation is pleased with the clarification provided by the Director-General which shows us how the somewhat confusing resolution before us can be interpreted as consistent with the UNISIST concept as we understand it. We are thus in a position to support the resolution as an adequate basis for beginning a very important program.

Our belief in the long term value of UNISIST has never diminished. As our Delegation stated when the Conference opened, we are convinced that effective sharing of the world's knowledge is an evermore necessary step toward scientific and social progress.

But we fear that the deeply felt need for the benefits that can surely follow a fully international effort may divert our attention from the long hard road that lies ahead. This is the reason we have emphasized the difference between the UNISIST Program led by UNESCO and the World Information System that is our goal for the future.

The house of knowledge must be built on sound foundations. We cannot expect to proceed without careful planning and good will to work together. We see the value of this Conference as leading to better understanding of the problems of developing countries, to practical actions that can be taken and organizations that can be counted on to carry out the work. Thus, the U.S. Delegation interprets and endorses paragraph 5 in the draft resolution as a statement that UNISIST should accord priority to the needs of developing countries. We regard the report of the consultative committee on the application of science and technology as an important and useful discussion of these needs. But it would be an unfortunate event if delegates returned to their countries under the impression that the creation of UNISIST--even with strong financing--was going to place on the doorstep of every school and factory, the worldwide collection of information; would put in place all needed equipment for information transfer; or would provide the needed means for putting to use this information.

Of course, these needs are real needs. They must be met, but we agree with our colleagues from the U.S.S.R.: it will take a worldwide effort of nations, of other U.N. bodies, of international and other organizations to realize this great task. The resources of UNESCO cannot do it alone even if we were wise enough to know just what was needed in detail. We reiterate our concern that the main burden of the work must be carried by organizations of expert documentalists who have already established international forums for the reaching of agreement on standards and conventions and on the large body of scientific experts who alone can provide quality control of the information to flow through the system and who can convert that information into a form appropriate with the users needs.

With regard to the administrative working proposal in the resolution, I would be less than candid if I did not admit that the U.S. has reservations about the rather cumbersome arrangements provided. We are reassured by our confidence in the Director-General's ability to establish an effective organization within this framework. It is important that the available funds be concentrated on the work to be done to the maximum extent practicable.

This Conference has made some important achievements--foremost among them the high degree of international harmony that has been achieved among so many states. The full participation of developing countries in the step-by-step achievement of harmonized information systems has a very important significance--not only to those states, but to the evolution of more useful information systems themselves.

Our Delegation believes that a very important factor in any science information system is the degree to which user needs are taken into account. Especially important when the scientific and using communities are not the same.

In many small towns around the world--even in the most industrialized countries--the local factors, the community school, the local library, etc., similar problems are found.

By a program of steady work--engaged in by the people of many nations large and small--the UNISIST goal can be achieved.